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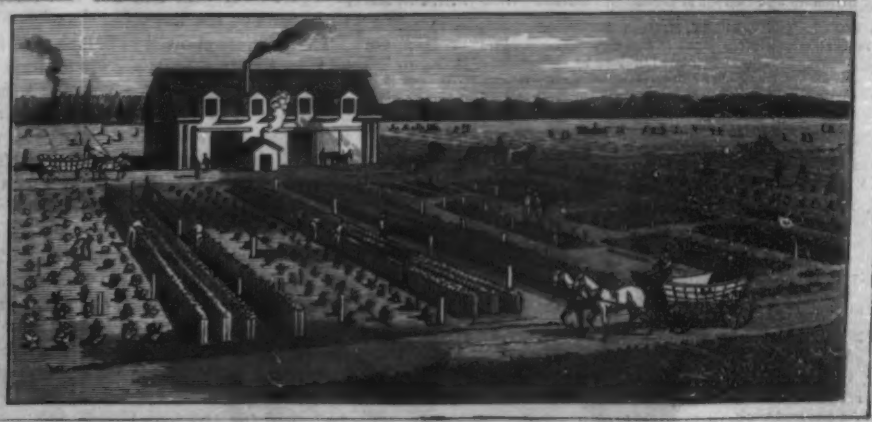
THE JERSEY FARM

PACKING ROOM



AMERICAN SEED INDUSTRY.—THE GREAT SEED FARMS OF DAVID LANDRETH & SONS.

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NEW YORK, SATURDAY, SEPTEMBER 23, 1882.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 351,

For the Week ending September 23, 1882.

Price 10 cents. For sale by all newsdealers.

ROSALINE COLOR PATENT, 250,247.

Nothing contained in the report of this case, given in our last number, was intended by us to convey the impression that there was any lack of confidence by the court, or anybody else, in the testimony of Professors Morton, Chandler, and Eudesmann. The eminence and exalted character of these gentlemen forbid the harboring of such an idea. Judge Blatchford appears simply to have held that the defendants had not entirely made out their case. We understand that additional proceedings are now going on, from which results may be expected that will wholly change the aspect of the litigation.

THE EGYPTIAN CAMPAIGN ENDED.

The war in Egypt is substantially ended. The British advance from Ismailia, on the Suez Canal, toward Cairo, along the line of the fresh water canal, made an early morning dash upon the Egyptian position at Tel-el-Kebir, September 13, and carried it with a rush.

The resistance was brief. The untrained Egyptians did not preserve the slightest semblance of order, but fled a confused rabble almost as soon as the attack began. The British loss is reported to be nine officers and forty-five men killed; twenty-two officers and three hundred and thirty men wounded. The Egyptian loss was about fifteen hundred killed and wounded.

The British pressed on promptly to the railway center at Zagazig, and thence to Cairo, which was entered on the morning of the 14th. The authorities of the city promptly yielded to the victors. Arabi is reported a prisoner, and, to all appearances, the revolt, which threatened to lead to a serious war, is practically crushed.

A TELEPHONIC HOAX.

Among the regular press dispatches from London, on the day of the bombardment of Alexandria, was one purporting to come from Malta, the cable station nearest the seat of war, stating that the firing of the guns was distinctly heard there by telephone through the cable.

Afterward the report was apparently confirmed by a paragraph in a morning paper stating that the experiments at Malta, by means of which the firing "was heard through 1,000 miles of ocean cable," were conducted by Mr. H. H. Eldred, formerly of Passaic city, New Jersey.

These statements were noticed in our issues of August 5 and 19.

We are now informed by Mr. Cyrus Field Willard, of the London and Globe Telephone and Maintenance Company, of which company Mr. Eldred is managing director, that there is no truth in them.

The author of the hoax was clever enough to make his story plausible by saying that though the cannonading could be heard no oral communication was possible. The fact is well known that there is an unsurmounted, perhaps unsurmountable, obstacle to telephoning speech beyond a quarter of the distance named; but in the absence of actual test, under all the conditions that might be possible during a bombardment like that of Alexandria, no cautious person would hazard the assertion that the novel conditions could not give the result reported. In the absence, too, of any obvious reason for misrepresentation, the report has naturally attained considerable currency.

We take pleasure in relieving Mr. Eldred of any suspicion of complicity with the fraud with which his name has been coupled.

STEAM FOR HEATING GREENHOUSES.

The heating of greenhouses of more than five thousand square feet of glass in the plant by steam, although of comparatively recent adoption among horticulturists, is fast growing in favor for large houses, as favoring a more perfect control in regulating the temperature to the variations of the weather than has been heretofore obtained with the water system. The economy of steam in fuel and boiler attendance has been tested in a number of large greenhouses with satisfaction to their owners, and in some cases claim of large percentage.

The fact of its affording a ready power for pumping water for watering with sprinklers under pressure, and for other purposes, is in itself quite a saving item.

The objection to steam heat on account of its dryness is found to be a myth, for the fact is fully admitted that *iron* pipe gives out heat and not moisture, whether it be filled with steam or hot water.

The pressure allowed in boilers used for this purpose may be from 3 to 10 pounds per square inch. With pumps now especially constructed for pumping with low pressure steam, no more than 10 pounds per square inch need ever be carried when the pump is in use.

The amount of pipe or radiating surface required in large greenhouses heated with steam varies very little from 1 square foot of heating surface to 6 square feet of glass, where the peak is not more than 12 feet high.

This heating surface should be distributed in lines so as not to overheat any one side or center, and a single line may be carried along the ridge, or peak, to advantage, each line having valves so that a fine adjustment of temperature may be made at all times.

The size of radiating pipe for most perfect circulation under low pressure, for houses 200 feet long, should be 2 inch, and for 100 foot houses, 1¼ inch to 1½ inch. This with large supply pipe will insure a proper return of the water of condensation to the boiler with the gravity system, where the water surface in the boiler is 8 feet or more below the level of the greenhouse floors. The gravity system is much preferred for its simplicity, but if the situation is such that it cannot be used, the return trap system is practicable and reliable, but requires some care.

The fire, being under the control of a damper regulator, only requires attention at intervals of a few hours. All of the water of condensation being returned to the boiler, the only waste of any importance occurs when the pump is running. This requires the use of a connecting pipe from the force pump to the boiler and its proper attention while the pump is running.

THE AMERICAN INSTITUTE FAIR.

The fifty-first annual exhibition of the American Institute will begin in its building, corner of Third avenue and Sixty-third street, September 27, to continue into December.

To the present writing a large number of entries have been made, and there is abundant promise of a display of more than average value and variety.

The manufacture of pottery will be represented for the first time at one of these fairs. Another novelty will appear in the manufacture of silk, beginning with the reeling of the raw material from cocoons. The light machinery in operation will include, also, machines for making clasps, spiral springs, tacks, wire nails, safety pins, etc. The making of wooden boxes by machinery will be exhibited for the first time.

Among the heavier machinery will be a considerable number of mills for quartz crushing and the separation of ores, an industry which is especially prominent in this year's entries. A number of new steam engines are promised, among them one of special novelty to be used in driving dynamos for electric lighting. The illumination of the building will be effected for the first time by means of incandescent electric lamps, 168 in number, to be supplied by the United States Electric Lighting Company. Other systems of electric lighting will also be shown.

It is to be hoped that intending exhibitors will excel those of previous years in getting their exhibits ready and in place for the opening. Too often, for the first week or two, the value of the exhibition is seriously marred by incompleteness and the disorder attending the installation of tardy exhibits.

POSTAGE STAMP FRAUDS.

In our paper for August 26 last, we gave a resume of the probable modes by which frauds were committed by the reuse of postal stamps, and we pointed out some of the directions in which improvements might be made with probable advantage.

The principal losses to the government appear to be, in brief, from the following causes:

1. Stamps are not canceled, or are so slightly defaced that they readily pass into second use and escape detection.

2. Canceled stamps are removed from the letters, the canceling ink washed off, the stamps regummed, and sold for reuse.

3. Uncanceled stamps are removed by rogues in the post offices, and old canceled stamps substituted. This probably is the way that a large loss is occasioned.

It would seem that the inventor who can make a really serviceable postage stamp that can be readily applied to an envelope, but which cannot be removed without the total obliteration of the stamp, will have produced a valuable improvement. By a serviceable postage stamp is meant one that will bear reasonable handling without injury, that has no poisonous qualities, that is easily applied, and, as just stated, that cannot be removed intact after it is once put on the letter.

PLIOCENE MAN IN NEVADA.

The frequent occurrence of wrought stone implements with remains of extinct animals in the gold gravels of California and elsewhere on the Pacific coast, has satisfied all who have critically studied the evidence so afforded that the advent of man in those parts must have been before the close of the latest division of the Tertiary period. There is, therefore, nothing startling in the discovery of foot prints, apparently of men wearing sandals, in Pliocene sandstone in Nevada; yet we may be sure that the deductions of the California scientists who have investigated the matter will not be suffered to go unchallenged.

The scene of the discovery is a quarry in the yard of the Nevada State prison, near Carson. The prison is situated in a valley three miles from the base of the Sierras, the site having been chosen on account of a ridge of sandstone there, in the quarrying of which the labor of convicts could be utilized. The prison was established about twenty years ago. In the process of quarrying from fifteen to thirty feet of rock has been removed from a space of an acre and three-quarters. The layers of sandstone alternate with seams of clay, and at the level of the tracks the rock appears to be the consolidated mud of an ancient lake or pond, which had been afterward buried under many feet of sand deposits.

As described by Dr. H. W. Harkness, who was sent by the California Academy of Sciences to study and report upon these supposed traces of ancient man—perhaps the earliest hunting party on record—there are six separate series of tracks of men with sandals or other foot gear, with from eight to seventeen footprints in each series, besides

numerous other tracks of birds and animals, including the mammoth, deer, wolves, and possibly a horse.

The first series of sandal tracks seems to have been made in a layer of mud perhaps two inches deep. It consists of twelve tracks, to which four were subsequently added by tunneling into the rock, about fifteen feet of rock overlying the continuation of this ancient trail. In his report to the academy Dr. Harkness says:

"In each instance the mud had been raised by the pressure of the foot into a ridge which entirely surrounded it. This mud is only partially solidified, and is still flaky and easily broken on exposure. Each of the imprints furnishes us with evidence, as we believe, that the feet of the one making the tracks were protected by sandals. In no single impression, perhaps, do we find conclusive evidence of this fact, but when we study them as a whole we find that that which is wanting in one is furnished by others which follow. In nearly all the toe portion of the sandal is well shown, it being as smooth as the work of a mason for the distance of two or three inches. Backward from the toe we generally find the impression of the outer portion of the sandal. When studied as a whole we can determine with a good deal of exactness the actual length and breadth of the sandal, which we find to be nineteen inches in length, eight inches at the ball of the foot, while the heel is six inches in breadth. In its outline the impression follows clearly the shape of the human foot. From the great toe outward there is a really graceful curve, which draws in toward the heel; while from the great toe inward the line is drawn toward the instep and thence in an outward curve to the heel. In one series this curve is deeper, showing a slightly different form of sandal. The average length of the stride is two feet three inches. The distance between the feet or the straddle is eighteen inches. In all these tracks the toes are turned well outward."

Near the series of tracks described are eight other tracks which are attributed to the mammoth. The foot is twenty-one inches in diameter, only the general outline being preserved; also many tracks of wading birds, not differing materially from those of modern herons and the like.

Several quite distinct tracks of deer are also to be seen. Others, again, were found which in size and length of stride much resembled those of a wolf. At one point these tracks may be traced for a distance of twenty feet, where they also are lost in the ledge. There are also a few poorly defined imprints of what Dr. Harkness believes to be a horse. Near the western limit were clear indications of animals having wallowed and lain in the soft mud.

Touching the great size of the tracks attributed to man, Dr. Harkness supposes that the feet were protected by sandals of wood. It may be that foot-gear of exceptional size was used in hunting on soft and muddy grounds. The stride is that of a man of average height, and the straddling gait a natural one in walking over soft and slippery places.

It is proper to add that Professor Le Conte, of the California University, is not entirely satisfied that the supposed sandal tracks are human footprints. Their great size staggers him, though the peculiar outline of the human foot is distinct. Since Dr. Harkness and Professor Le Conte were at the prison, Warden Garrard has developed three more series of footprints apparently made by men.

One series of more than a dozen prints was uncovered by means of a stream of water turned on the floor of the quarry next to the ledge where the rocks are about thirty feet high. These tracks lead into the cliff, and appear to have been made by a man who was dragging a heavy load after him through the mud. The tracks are all turned sidewise, as they would be under such conditions.

THE BRITISH ASSOCIATION.

The fifty-second meeting of the British Association for the Advancement of Science began at Southampton, August 23. After mentioning the losses which the association had sustained in the death of its distinguished member, Charles Darwin, and that of its Secretary, Professor F. M. Balfour, whose promising career was recently cut short by accident in the Alps, the President of the Association, Dr. C. W. Siemens, proceeded to give the usual review of recent scientific progress and its conditions, dwelling, at first, especially upon the interdependence of theoretical and practical science.

Speaking of the facilities which the railway systems afford for the holding of scientific meetings among men, and of the extraordinary development of scientific journalism, he remarked that however much the means of acquiring scientific information have increased, the necessities for scientific inquiry have increased in a greater ratio. The time was when science was cultivated only by the few, who looked upon its application to the arts and manufactures as almost beneath their notice. That was left to others, who cared little for the pursuit of science for its own sake, but merely sought to turn scientific discoveries to practical account.

Progress could not be rapid under this condition of things, because the man of pure science rarely pursued his inquiry beyond the mere enunciation of a physical or chemical principle, while the simple practitioner was at a loss how to harmonize the new knowledge with the stock of information which formed his mental capital in trade. Under the new order of scientific and practical development the purely scientific man has become more inclined to consider the utility of his discoveries, while the practical man has become scientific, often taking the lead in scientific discovery. The application of chemistry to dyeing amply illustrates this change. So too does telegraphy and the new arts of applying electricity to lighting, to the transmission of power, and to metallurgical operations, in which the practical man is beset at every turn with problems requiring for their solution not only an intimate acquaintance with, but often a positive advance upon, electrical science as established by purely theoretical research in the laboratory. Equally is this interdependence of theoretical and practical science the rule in the advancement of constructive engineering.

"It is to the man of science, who also gives attention to practical questions, and to the practitioner who devotes part of his time to the prosecution of strictly scientific investigations, that we owe the rapid progress of the present day, both merging more and more into one class, that of pioneers in the domain of nature. It is such men that Archimedes must have desired when he refused to teach his disciples the art of constructing his powerful ballistic engines, exhorting them to give their attention to the principles involved in their construction; and that Telford, the founder of the Institution of Civil Engineers, must have had in his mind's eye, when he defined civil engineering as 'the art of directing the great sources of power in nature.'"

The principal subjects discussed at the meetings of the Association are becoming more and more general in their scope, and many of them of international character; such as the systematic collection of magnetic, astronomical, meteorological, and geodetic observations; the formation of a universal code for signaling at sea, and for distinguishing lighthouses, and especially the settlement of scientific nomenclature and units of measurement, regarding all of which an international accord is a matter of the utmost practical importance.

The subjects which Dr. Siemens discussed at greatest length were those of which he has done so much to further the development—both practically and scientifically—namely, electrical measures and measurements, the transmission of energy, the application of electricity to horticulture, electric railways, electric lighting, and so on.

A full report of this instructive and suggestive address will be found in the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT.

A Massive Safe Deposit Vault.

The safe deposit vault for the Nassau Bank, corner of Beekman and Nassau streets, is said to be the largest steel vault ever constructed. It is made of welded chrome steel, iron, and Franklinite, and is, to all appearances, thoroughly fire and burglar proof. Entrance to the vault is effected through the bank proper. A staircase of marble and iron leads down into a well lighted and ventilated basement, about 12 feet high. The floor is paved with tile mosaics and marble. The vault, which is 35 feet long, 23 feet wide, and 9 feet high, is built clear of the walls of the building, and rests upon a thick foundation of concrete and granite. The sides, bottom, and top of the structure are very thick, and comprise inner and outer walls of welded iron, chrome steel, and Franklinite, between which is a solid layer of fireproof cement, 9 inches thick. There are two massive iron doors at each end of the vault, and the outer ones are the largest single doors ever made for this purpose. The doors are built of the same material used in the construction of the vault. The inner doors are about 6 inches thick and the outer are of the same thickness, but larger and hung on central hinges. Their locks are double dial time locks of the very best make. It will require two persons to get into the vault, for one will have the combination of the inner doors and the other the combination of the outer doors. Outside of the heavy steel doors are electric burglar alarm doors, which cannot be tampered with without sounding a loud alarm. There are now nearly 1,400 safes in the vault, but that number is to be increased to 4,000. These safes are 24 inches deep, of various sizes, and are made of half-inch chrome steel. The door of each is provided with a double key lock, and some of them have combination locks. No customer can unlock his own without the help of the attendant, who has a key with which he sets each lock. Neither the customer nor the attendant can get in singly. The vault is lighted by the electric light.

The Fur Seal at Sea.

On the voyage to Sydney two fur seals were seen about the ship. They were of a smaller species than that occurring at Kerguelen's Land. They swam alongside with remarkable ease and rapidity, having in the water just the appearance of porpoises.

The hind limbs were stretched out straight behind as the animals swam, and the motion mostly maintained by rapid strokes of the fore limbs. The tail, however, *i. e.*, the finlike expanse formed by the closely applied and outstretched flat hind flippers, was used with an undulating movement, just as is the tail fin in porpoises.

The seals swam with ease and rapidity from the stern to the bows of the vessel, though it was going 4½ knots at the time, thus going 9 knots at least. In fact, they swam with all the ease of a porpoise, and as once or twice they threw their heads and backs out of the water in a forward leap I should certainly have mistaken them for these animals had I not seen them almost at rest several times, and with their heads well out of water.

I never before realized the close connection between the seals and whales, and how easily a whale might be developed out of a seal. The fur seal is one which, on land, still bends its hind limbs forward, as do land mammals.

The seals without external ears, like the sea elephants, carry them habitually stretched out behind, as this one does in swimming.

Little modification would be necessary in order to turn the otherwise useless hind limbs of the earless seals into the whale's broad tail fin, which probably represents the remains of the seal's webbed hind flippers.

We afterward, in the Straits of Magellan, became familiar with the motions of fur seals in the water, and frequently saw them there in shoals, progressing through the water by a series of leaps exactly like porpoises or rock-hopper penguins.—*Challenger Notes—Moseley.*

A New View of the Earth's Evolution.

The assumption that the earth was at one time in a fluid condition, as held by Laplace and by many astronomers and geologists, was disputed with a suggestive array of evidence by Dr. Houghton, of Dublin, before the Science Association at Montreal.

Following are some of his reasons for doubting the fluidity of the earth or any other planet at any stage of its evolution:

1. The possibility of the equilibrium of the rings of Saturn, on the supposition that they are either solid or liquid, has been more than doubted, and the most probable hypothesis concerning them is that they consist of swarms of discrete meteoric stones, discrete meaning that they are separate from each other in space.

2. It is difficult to understand the low specific gravity of Jupiter and the other planets on the supposition that they are either solid or liquid, for we know of no substance light enough to form them. If the outer planets consist of discrete meteoric stones moving around a solid or liquid nucleus, the difficulty respecting the specific gravity would disappear.

3. The recent researches connecting the periodic showers of shooting stars with comets tend in the direction of showing that comets in cooling break up into discrete solid particles, and that probably the solar nebula cooled in like manner into separate fiery tears, which soon modified by radiation into the cold of space.

Mr. Huggins's recent comparisons of the spectroscopic appearances of comets and incandescent portions of meteoric stone shows the presence in both of hydrogen and nitrogen compounds, confirming the conclusions drawn from the identity of the path of comets and meteoric shooting stars.

From all these and other considerations it is allowable to suppose that the earth and moon, when they separated from the solar nebula, did so in the form of solid meteoric stones, each of them having the temperature of interstellar space—that is, something not much warmer than 460° Fahrenheit below the freezing point of water.

Enameling Cast Iron Pipes and Castings.

A recently invented process is as follows. There are various receipts for the enamel, depending on the purpose for which it is applied. One for water pipes is as follows: twenty-eight parts by weight of silica, eleven calcined carbonate of soda, and six carbonate of lime. Another is: thirty-four silica, eleven carbonate of soda, twelve chalk, and eleven dried pipe clay, to which boracic acid or lead oxide can be added when a more vitreous enamel is required. The core forming the inner surface of the pipe—and if desirable, the mould too—is coated with blacklead, smoothed, and the enamel as a powder, paste, or pigment, applied to the thickness required. The molten iron causes the enamel to soften and firmly adhere to the iron. If it is not necessary that the enamel should not be smooth, the blacklead is omitted.

The enameled pipes are much appreciated in Bohemia; the Municipal Council of Egar have passed a resolution to use no other kind. The enameled pipes are now being manufactured in several works in Germany and Austria.

Fishing for Rats.

A novel mode of catching rats is thus described in the *American Angler*. The writer says that a person having the patience of most fishermen can have much sport in hooking the vermin.

The warehouse adjoining his place of business is infested by these "file-tails," and our friend may be seen in the early spring, and late fall, on an occasional evening just after dusk, seated at the back window of his counting room (overlooking the yard of the warehouse), with an ordinary rod in hand, strong linen line, and a spring hook, commonly called a "sockdolager," baited with a lump of fresh beef, patiently waiting for a bite. It does not tarry long nor does it consume itself in nibbles, but with a hungry snap the bait is seized, and the hooks of the sockdolager impales the rat, when the excitement commences.

A lusty rat is no mean antagonist at the end of a pliant pole and ten feet of line, and his plunges, twistings, and straight-away dashes are more perplexing to the angler, than the leaps, surges, and sulkings of the gamy trout or bass. The rat is generally landed, after seasonable sport, and killed by a blow from a bludgeon.

In this connection we may state that thousands of small hooks are bought by sugar refiners for ratting purposes. The hooks are baited with small pieces of beef on each, and then distributed about the building. The rats swallow beef and hook—the first is digested, the latter is not—death of course results. The remedy is said to be infallible.

Fish Curing in New York.

The practice of setting aside the surplus of our city fish markets in seasons of plenty to meet the demand when fish are scarcer or entirely out of season, has led to the establishment of enormous refrigerators, or buildings for "cold storage," in which tons of fresh fish are securely locked up in ice and kept for months. The magnitude of this cold storage business and its relative novelty have attracted to it no little popular attention.

Less generally known, but probably of greater financial and economic importance, is the business that has grown up here in drying, pickling, and smoking fish. For the most part the city cured fish are taken by fishermen under contract, and roughly salted at sea. They are mainly cod, mackerel, and salmon. Other establishments are directly engaged in sea and shore fishing. One firm, which cures from 15,000 to 40,000 pounds of fish a week, make a specialty of smoked shad and sturgeon. The sturgeon are taken in drift nets off the coasts of Florida and Georgia. The nets are 100 fathoms long and 20 fathoms deep, the sturgeon often weighing from 300 to 500 pounds each. Occasionally the capture of a large shark or alligator gives serious and unprofitable diversity to the work of the fishermen. When caught the sturgeon are cleaned, the back bone is cut out, and the sides packed in ice and sent to Savannah. There the fish is packed in fresh ice and shipped by steamer to New York. Here the sides are cut in slices, pickled in brine for four hours, dried, and smoked. The drying takes about six hours and the smoking fourteen hours. The smoke is made from hickory wood and cedar sawdust, and the smoking room is hot enough to thoroughly cook the fish. Other fish are smoked in substantially the same way. The sturgeon roe is immediately treated to successive washings, passing each time through sieves to cleanse them thoroughly, and are then packed in salt. The result is *caviare*. The same parties have sturgeon fisheries in Delaware, and eel fisheries there and in New Jersey. The best and fattest eels are said to come from the mouth of the Shrewsbury River. The eels are thoroughly scrubbed to remove the slime, and either smoked or put up in jelly. Herring are roasted and put up in kits in pickle. Considerable quantities of smelts from the coast of Massachusetts are smoked. Also many lake whitefish, which is accounted particularly fine in flavor. Mackerel smoked round when fresh—Boston smoked—is becoming a popular preparation. All the fish to be smoked are brought to the city fresh, packed in ice, except salmon, which during part of the year is pickled.

The home and foreign demand for fish cured in New York is large and rapidly increasing. The industry promises to become very large.

Experiments with the Heliograph.

A detachment of nineteen men of the Sixth Cavalry and Twelfth Infantry, near Fort Grant, Arizona, under command of First Lieutenant M. P. Maus, First Infantry, has been testing the practicability of heliographic signaling since July 1, and it is pronounced a grand success. Lieutenant Maus has signaled messages from the top of Dos Cabezas Mountain to Fort Grant, a distance of forty miles, which were read at once by his party at Grant. Messages can be sent with the heliograph at the rate of from six to twelve words per minute, according to the ability of the operator, and it is a splendid substitute for the telegraph, should the Indians cut the lines, which they have been doing, and always can do, when on the warpath, while they cannot cut a sun flash. It is understood that heliograph lines are about to be established by Lieutenant Maus, and partly under direction of Colonel Bracket, commanding scouting operations connecting Bowie, Grant, Thomas, Apache, and points along the Gila River, in the vicinity of Solomonville and Clifton, enabling troops in the field to be in constant communication with one another, without waiting for couriers or the proximity of a telegraph office. The signalmen, on account of their elevated positions, are enabled to observe with their glasses the movements of the hostiles, and in a few minutes to communicate it to any command in the field, each of which is always to be accompanied by one or two heliographic signalmen. The great advantages of this system of transmitting messages in a mountainous and hostile country are self-evident.—*Cor. Morning Call.*

Crayons in Vitrifiable Colors.

M. Lacroix, a Parisian chemist, has introduced crayons similar to the ordinary lead pencils, the lead being replaced by vitrifiable colors. The colored designs which are executed with these crayons, on slightly roughened glass, bear the heat of a muffle and are fixed like a painting upon glass; the grays especially give excellent results. A similar process which was tried upon porcelain some years ago was unsuccessful, probably because enameled surfaces were used. On biscuit it is likely that good results might have been obtained.—*Chron. Industr.*

IMPROVED WASHING MACHINE.

The engraving shows an improved washing machine recently patented by Mr. Thomas J. Meroney, of Salisbury, N. C. In this machine the clothes, while under the pressure of a corrugated roller, are subjected to the action of steam, so that while the clothes are being agitated or rubbed they are subjected to the action of steam.

This machine has a plain wooden tank lined with copper or galvanized iron, with perforated pipes in the bottom for the admission of steam, with corrugated copper or galvanized iron roller of sufficient weight. This roller gathers the air while passing back and forth over the clothes, and forces air and water through the fabric. At same time the steam is thrown up through the perforated pipes at the bottom of the tank. There are wooden strips between the pipes

MERONEY'S WASHING MACHINE.

to protect them and make the bottom of the tank smooth. This machine is very simple both in construction and operation. It can be operated with very little exertion, and does its work quickly and thoroughly. It will wash the thickest fabric as well as the thinnest muslin or lace. In addition to its use as a clothes washer it may be used for washing wool, and the boiler answers a good purpose for steaming and boiling grain and vegetables for stock.

This machine differs from other washing machines in using steam as the principal agent for agitating the clothes and removing the dirt. Of course the steam always keeps the water at the boiling point, which is very desirable for rapid work.

Further information may be obtained by addressing the inventor as above.

IMPROVED CORN CRUSHER.

An improved corn crusher invented by Mr. George C. Mueller, of Red Bluff, Cal., is shown in the engraving. It is designed for crushing ears of corn to reduce them to the proper state for fodder. The machine consists of two parallel cylinders journaled in a frame, and inclosed by a suitable

MUELLER'S CORN CRUSHER.

casing surmounted by a hopper, into which the ears of corn are fed. The upper cylinder carries a number of saws arranged a small distance apart, and revolves near a concave also made of saws, which are curved to form a tapering cavity in which the ears of corn are received. The saws of the concave enter the spaces between the saws of the cylinder, so as to insure a more thorough breaking up of the ears.

The corn entering the machine is first crushed into small fragments by the saws. It is then delivered by an inclined chute to the cylinder below, which is provided with a series of pins arranged in circumferential rows. This lower cylinder revolves near a concave, also armed with pins, and between these pins the corn is reduced to meal suitable for fodder. The meal is discharged into the box below.

The machine may be driven by hand power, horse power, or by connection with any convenient motor. It is compact, effective, and easily operated.

Further information may be obtained by addressing the inventor as above.

History of Plant Life in America.

An interesting sketch of the history of plant life in America was given by Professor Newberry at the Montreal Science Meeting. In the archæan rocks is graphite, which must have been derived from plant tissues, but all possibly have been obliterated. In the Cambrian only seaweeds have been found. In the Lower Silurian the presence of land-plants had been claimed, but without satisfactory evidence. In the Upper Silurian a few club mosses have been met with in Europe and America. In the Devonian the land was clothed with plants, some 200 species having been described by Dr. Dawson. They were ferns, lycopods, and equiseta. In the Devonian Sea were islands near where Cincinnati stands, and they were covered with tree ferns and giant club mosses.

The carboniferous flora was known the world over. It consisted of ferns, lycopods and equiseta, conifers and cycads. In the time of the Trias, to which the New Jersey brownstone belongs, the vegetation was mainly sago palms and pines, with many ferns peculiar to the age. In the cretaceous age the vegetation of the globe was revolutionized, angiosperms and palms taking the places of the cycads, etc., of the Trias and Jura. In New Jersey and in the far West perhaps 250 species of trees had been found resembling those now living, as they included oaks, birches, and willows, as well as the tulip tree, sweet gum, sassafras, magnolias, etc.

The Tertiary was the age of North America for animals and plants. For them a mild climate prevailed to the Arctic Sea, and the land was covered with splendid forests, of which the great sequoias of California and the finest of our trees are a remnant. Then there was land connection between America and Europe and Asia at high latitude, and the American flora which began here in the cretaceous extended into both continents. When the ice period came on the forests were driven south. In Europe the Mediterranean prevented their escape, and then American plants were destroyed, to be succeeded by an Asiatic vegetation when the climate became milder. The floras of Japan and Eastern America are very like the remains of typical trees of the American flora of this age. Tulip trees, sassafras, and magnolias were found in Europe as far south as Italy. In China and America part of this vegetation survives, and the vegetation of Japan and Eastern China is so very like that all botanists are agreed that they must have had a common origin. Curiously enough some of the plants extinct in America had survived in China, among which are the ginko and glyptostrobus, two beautiful conifers once common on the Upper Missouri, now found only in China.

New Machine for Manufacturing Bone Black and Ammonia.

Messrs. H. Y. Castner & Brother, analytical chemists, of New York, have patented a machine for the manufacture of bone black and ammonia, which, if their claims are to be credited, promises to cause a revolution among manufacturing chemists. The process consists in passing crushed bone continuously through a heated vessel or cylinder, charring the bone thereby; then conducting it without exposure to an air-tight receptacle, where it is cooled, and the gases emitted therefrom are drawn off and subjected to such chemical action as to recover all the ammonia. By this process the bone black and salts of ammonia are produced continuously at a great saving of time, labor, and heat.

The patentees have erected in Jersey City, at considerable cost, an experimental machine, which has been visited by a number of chemical experts, all of whom unite in pronouncing it a great success, not only as a piece of ingenious mechanism, but for the superior quality of its products. With a consuming capacity of one ton of bone per day the patentees claim that they can effect a saving of over twenty-five per cent by this machine; and we understand that a company is being formed with the view of erecting another one capable of burning ten tons a day, in the operation of which, they claim, a still greater percentage of saving will be effected.

FALL OF A METEOR.—During a heavy thunderstorm at Lebanon, Pa., on the 8th of September, a meteor, weighing one pound and eleven ounces, fell in the center of the principal street, appearing like a ball of fire as it struck the ground. It is now in the possession of Dr. Mears.

BLOOMSDALE SEED FARM.

Stretching out two miles along the banks of the beautiful Delaware, above Bristol, is Bloomsdale, the "home" farm of David Landreth & Sons. This property comprises about six hundred acres. It is half a mile in width, bounded by a canal on the inland side, and longitudinally cut in two by the Pennsylvania Railroad. One of our illustrations is a view of the central group of buildings, on the roofs of which, in large lettering, distinctly discernible from the cars, one reads,

LANDRETH'S GARDEN SEED FARMS.
PEDIGREE SEEDS.

In addition to this farm, the firm has one hundred and thirty acres across the river in New Jersey; five thousand acres in Virginia, this latter principally devoted to Forestry; and large tracts for the cultivation of garden seeds in Wisconsin. The farm near Bristol is valued at five hundred dollars per acre on the average, and in part at one thousand dollars.

There is also here a fine, it is said, the finest developed *arboretum* in the country. It contains over one thousand distinct species of hard-wooded trees and shrubs, largely evergreen and resinous, collected as a matter of taste from all parts of the world, North and South America, China, Japan, the Himalaya Mountains, Australia, Siberia. Many species have failed to endure the heat and cold of a Pennsylvania climate, but these have proved hardy, and present beautiful varieties of rich, dark blue and golden yellow in color, with every weird and fantastic shape, from the erect spire of an Irish yew, to the graceful sweep of a weeping willow.

It is said that, including all the farms referred to, this firm *owns* and *cultivates*, in Garden Seeds, a larger acreage than any seed-growing establishment in the *world*, and that claim goes unchallenged. And, though there are extensive seed growing districts in Germany and England where the industry is carried on, they are for the most part small holdings, or where of extended breadth, are rented lands worked on contract.

This business has had the long and slow growth which seems to be the history of great enterprises. It represents three generations of man, from father to son and grandsons, succeeding to the experience and the estates.

"The founder of this establishment, which has now grown to such proportions, was David Landreth. He was a native of England, and, emigrating to this country one hundred years ago, settled on a small tract of land comprising a part of what is known as the Neck, below Philadelphia, where he was one of the first, if not the very first, to inaugurate the work of seed growing as a business in this country. He appears to have possessed in a high degree skill and enterprise, for his efforts were highly successful, the business continuing to increase from year to year. He was succeeded by his son, now deceased, who prosecuted the business with even greater energy than had characterized his predecessor. Mr. Landreth, in the course of time, found it necessary to seek a new location for his increasing business, and accordingly, in the year 1847, he purchased this property, known as Bloomsdale. The tract originally consisted of about two hundred and thirty acres. This has been increased by subsequent purchases, until the whole farm now embraces six hundred acres of land, all of which, except the lawn surrounding the mansion, is under cultivation in garden seeds.

Sixty years ago they opened business connections with British India, and all gardeners there have long been familiar with Landreth's seeds. They now ship tons of seed to that country per annum, the managers of government establishments there as well as private planters finding American seeds to be superior to European, both as respects *purity* and *vitality*.

European seeds are well known by experienced gardeners in this country not to be as good as American—not as "mature." The hot American sun, ripening the seed more thoroughly, is more favorable to the development of vitality. A few kinds of vegetables do not perfect seeds in this climate, such as cauliflower and broccoli; such are always imported. Philadelphia has ever been considered the center of the Seed Trade in the United States; it was the first to develop it, and has always possessed the finest vegetable market in the Union.

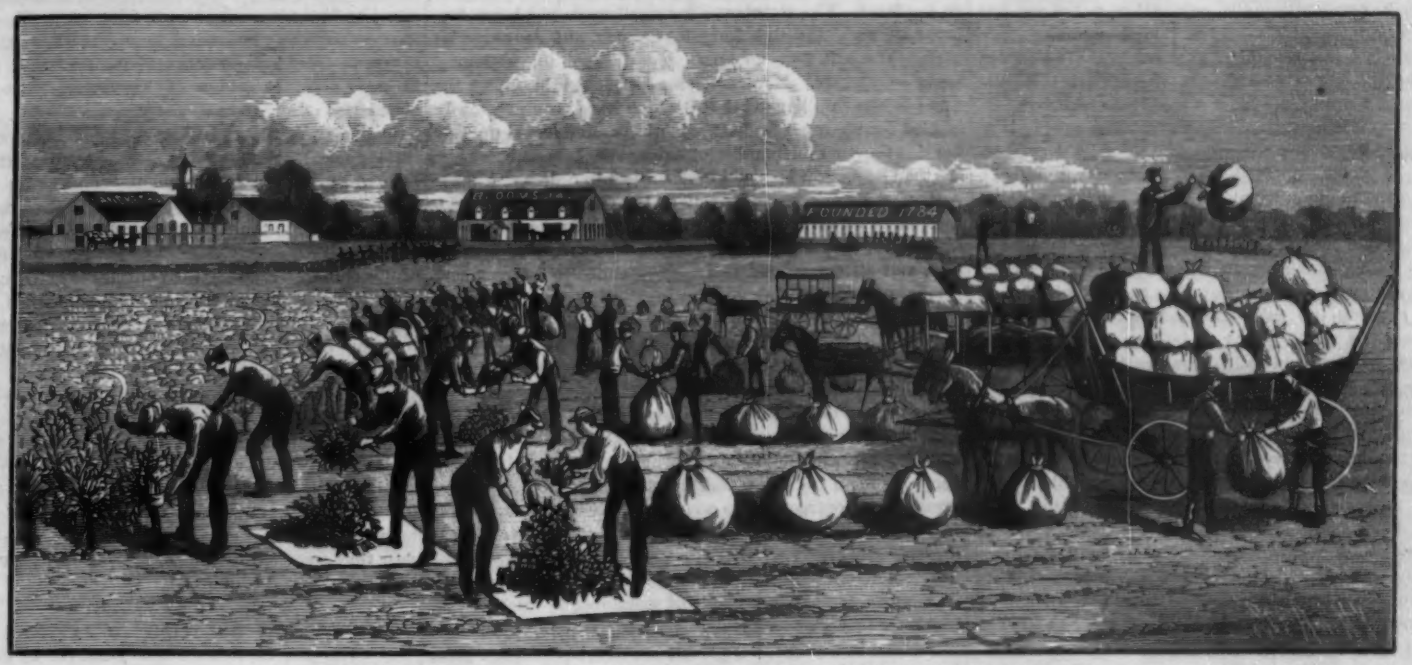
The varieties of seeds sold by this firm is far greater than would be supposed by any one not a seedsman. At the Centennial International Exhibition it was officially reported by the foreign judges, "*that the extent of the exhibit, and the purity of the seeds, being one hundred and ninety* (190) *varieties of garden and field seeds, twenty* (20) *varieties of dried grasses, fifty* (50) *varieties of forage plants growing in pots, and fifty* (50) *varieties of grain in the sheaf, was worthy a special award.*"

We have ourselves enumerated 435 catalogued garden and 360 flower seeds, in all 795, and believe this to be rather below than above the true figures. The names are frequently suggestive of peculiar qualities, as, for example, "Landreth's Extra Early Pea." "Heat Resisting Lettuce," "Beefsteak Tomato." As indicating the extent of the operations, we note that in April of this year there was sown cabbage seed on their various farms which produced forty million plants for setting out in July and August, to perfect seed in July next year, thus requiring *fifteen months* from seed time to harvest.

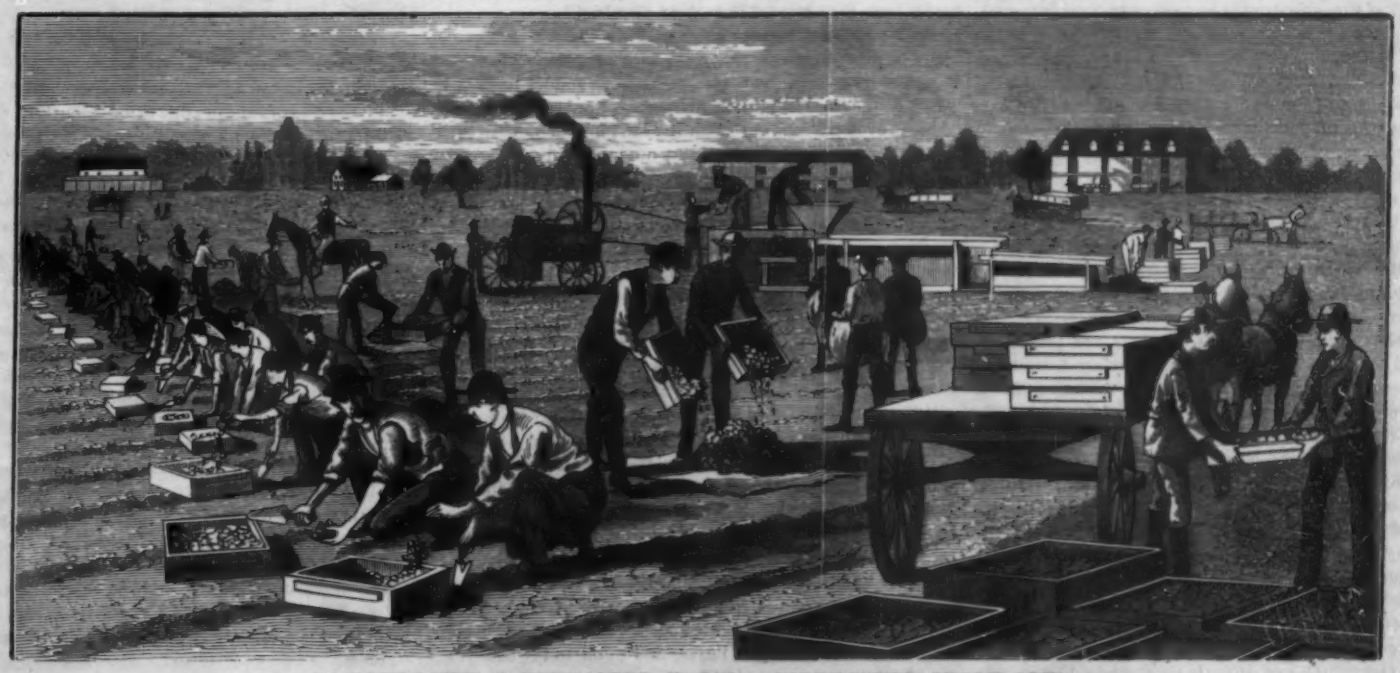
Of watermelon, squash, and cucumber seed twelve tons are sold; of onion seed, they drilled last April, to produce "sets," thirty-seven hundred pounds, valued at nearly fifteen thousand dollars.

If these figures show the "plant," what must the product and sales be? The *average* quantity of seed in store for sale, which of course varies, is at cost value from two hundred and fifty to three hundred thousand dollars. Stable manure is brought from Philadelphia, and is mostly obtained from the passenger railroad companies. Of this and street dirt, thirty thousand cart loads are used. This is brought up in boats and landed at various points on the farm. In addition to this large quantities of superphosphate and Peruvian guano are employed to stimulate the growth of the various crops. On the Virginia plantation, green fish, caught in the Chesapeake, are plowed in by many millions annually.

The Pennsylvania and New Jersey farms, located on opposite sides of the river and, comprising over seven hundred acres, we will consider as one plantation, being worked under the immediate direction of the resident proprietors. The field hands range from one hundred to three hundred, often more. A considerable number of Italians are employed, and are said to make most satisfactory workmen.



D. LANDRETH & SONS' SEED FARMS.—HARVESTING SMALL SEEDS.



D. LANDRETH & SONS' SEED FARMS.—COLLECTING ONION SETS.

The plowmen are housed in thirty-five (35) cottages, most after the fashion of large estates in Europe. Six stables are built in different parts of the plantation, the central one two hundred feet long. When necessary over twenty double plows can be quickly assembled without deranging other regular operations.

They invent many, and make and repair all their own tools—plows, wagons, threshing machines, and seed drills, possessing complete shops and employing experienced mechanics.

Our engravings so perfectly picture the farm that they require no explanation. One there looks upon the land and buildings as they are. It has a prairie-like surface, marked out by permanent roadways into long parallelograms of from five to ten acres; no trees, no rocks, no interior fences, no waste room; constantly under cultivation, never any rest—thus this strain can only be met by liberal manuring.

Bloomsdale is a vast vegetable garden; but it is a garden only for the raising of *seed:* not a vegetable is sold; the plants mature; the seed ripens, and it alone is removed.

The first step in the work of successful seed raising is to secure the growth of well matured and healthy vegetables from which to produce the seed. This, of course, requires a rich soil and thorough cultivation, which is well understood and practiced at Bloomsdale. There is little of novelty or interest about this part of the business to such persons as are familiar with vegetable growing on a large scale. Everything on the farm is planted in rows, so as to admit of easy culture by running the cultivator and similar implements between them. A great variety of implements are in use, but the plow, harrow, and cultivator are the main dependence in the work of tillage. Of the *two classes of vegetables* from which seeds are raised, *annuals* and *biennials*, the former, among which are radishes, lettuce, etc., give generally least trouble, as the seed can be obtained from them in four to five months. The tomato, however, which is an annual, is rather an exception, on account of the great amount of labor required in separating the seed from the pulp, to which more particular reference will be made hereafter. Among the biennials is cabbage, which requires about fifteen months from the time of planting until a crop of seed is obtained. Cabbage, and also beets, carrots, turnips, have to be kept over winter, to be planted for seed the following spring. There is often a great loss sustained in this way; in some cases a large part of the crop of cabbage decays and becomes worthless during the winter. It is, therefore, necessary, to have a much larger area planted the first season for raising the heads than is expected to be taken up for the production of seed the next spring. This year the firm have planted on their various farms 350 acres with cabbage for the raising of seed heads. They commence setting out the plants about the first of July, and continue during August. The implement used in planting the cabbage is the dibble, well known to all gardeners. With this an average man can put 9,000 plants into the ground in a day. The time required to secure a crop of beet seed does not vary materially from that necessary to obtain it from cabbage, and the same is true of several other vegetables of a similar character.

The seed harvest is now in active operation on Bloomsdale. Several of the earlier crops have already been gathered. The first one taken in is corn salad. This is followed by the gathering of the turnip crop, with which 135 acres of ground were planted. The crop of cabbage seed has also been gathered. The seed from 40 acres of spinach has been harvested. The crop of parsnip seed this season amounted to nearly 400 bushels. Last week the harvesting and threshing of the crops of beet and onion seed were in progress. Thirty-five acres were planted with beets and fifty with onions producing seed this season. The sickle is the implement generally employed in cutting the ripened plants containing the seed. As the seed stems are cut off by the reapers they are carefully placed in piles on large square sheets of canvas. The four corners of the canvas are then drawn together, and the bundles of seeds are placed on wagons and hauled to the barns or drying houses, of which there are fifteen. In addition to the threshing floors, they are fitted up with a succession of scaffolds of boards, arranged a short distance apart and placed one above the other at suitable distances, on which the seed, if wet when cut, is placed to expose it to the air to dry it for threshing. The extent of drying surface afforded by these buildings is four acres of ground. Some of the seeds, among which are Lima beans, are threshed with the flail, the rest are run through machines similar to our ordinary threshing machines, varying in their internal arrangement to suit the different kinds of seeds to be threshed. They are propelled by steam, and for this purpose *fire engines* are employed on the various farms. One of these is an eighteen horse power stationary engine. This is used for threshing, for grinding corn and other feed for stable use, and for grinding fertilizers.

The harvest season begins about the first of June and continues till the middle of September. During this period one, and sometimes all five, of these engines are constantly at work. The work of separating the seed from the hulls or chaff which remains after the bulk of the straw and refuse material has been removed during the process of threshing, is performed by the ordinary grain fan, or machines constructed on the same principle. These are variously arranged so as to adapt them to the different size and weight of the seeds that are to be cleaned. During our visit some of the workmen were engaged in the large main barn, in the middle of the farm, in putting the finishing touch on a portion of this season's crop of parsnip seed, already alluded to. On one side of the barn floor was a huge pile of the raw material just as it remained after threshing. This was being shoveled into the hopper of the fan by one of the men, in the manner of oats or wheat, and from the machine, which was turned by another person, the seed ran out nicely cleaned. On the other side of the floor there was a heap of the pure seed, which would open the eyes of the person who, in his observation of seed growing, has not gone beyond the small ten cent papers of the articles that come from the warehouse in Philadelphia.

After the seed is threshed and dried it is put up in sacks of convenient size for handling, and part shipped to the warehouse in Philadelphia, the rest deposited in storehouses on the farm. The storehouse for small seeds is a large fireproof building, 210 feet long by 40 wide, and three stories high. There is here an apartment devoted to putting up seeds in packets. Here girls are employed in filling the small papers familiar to all, and which have been previously labeled for the retail trade. When filled and sealed up they are tied together in bundles of a dozen packets each. They are then packed in bins and held subject to orders. A large part of the work is performed at the warehouse in Philadelphia, to which large quantities of the seeds are forwarded as soon as they are ready for sale. Sales are made in the city, and all correspondence there attended to. Great care is employed in planting, cultivating, and threshing, to keep each kind of seed and the several varieties of the same sort separate. To prevent hybridization among so many varieties of plants, extended areas of land are necessary and careful calculations as to the location of crops.

Among the crops to be harvested are thirty-five acres of radishes, now almost ready for the sickle, and the remnant of forty acres of onion sets. There are also thirty-three acres of Lima beans, in addition to which there are large areas out on contract. The quantity of peas and bunch beans annually sold by the firm amounts to about seventy car loads.

The storehouses used as drying-houses for unthreshed seeds in summer have floors capable of sustaining any weight, and in winter furnish warehousing space of vast extent. In them are stored heavy and bulky seed, such as peas, beans, corn, beet seed, onion sets, etc.

The tomatoes, now growing for seed, cover an area of fifty acres. It requires *thirty thousand bushels* of this vegetable to produce enough seed for their yearly sales. As they ripen the tomatoes are pulled off, put in barrels, and hauled to the Delaware for the purpose of washing out the seed. They are first mashed in the casks with stamps until well broken to pieces; this mass is then put into coarse wire sieves working in water; these are of sufficient size to allow the seed and smaller portions of the pulp to pass through into a box prepared to receive them, leaving the larger pieces of the tomatoes in the sieve to be thrown away. The seed and finer particles of pulp are then put into a finer sieve, by which another portion of the pulp is got rid of. This is continued with successive sieves of a finer grade, until the last is reached, which is of just the right size to retain the seed and allow the remaining portion of the pulp and useless matter to pass through. All that is required to complete the operation is to dry the seed, when it is ready for the fan.

Six or seven acres are taken up with peppers. About two thousand bushels of these are necessary to supply the yearly wants of the establishment. There are now forty-five acres of beets growing on the farm for seed in April, 1883, with about the usual proportion of the other biennial root crops under cultivation for the same purpose.

Corn, potatoes, and the common grains and grasses are not raised on the farm. Such of these as are wanted for seed are grown by outside parties, under the supervision of the firm. Only the tender plants, and such as require a long season to mature, are started under glass, but these are of sufficient amount to require sash enough to cover more than an acre of ground.

To us the most interesting part of the farm was the "*trial ground*," covering three acres.

"The entire list of vegetables from A to Z is here on trial, not one sample of each, but comparative lists of sometimes two hundred of each sort. Samples of their own, samples from the counters and seed lists of American seed merchants, samples from Canada, England, France, Holland, Germany, Italy, all classified, ranged side by side, and numbered consecutively from one up into the thousands.

"Two hundred and fifty trials of peas, one hundred and thirty of turnips, one hundred and fifty of cabbage, one hundred and ten of mangolds and beets, fifty of sugar corn, one hundred and sixty of beans, and so on to the end of the chapter.

"Neatness, next to the unexpected display of numbers, was the striking feature; the land was laid out in parallel beds, two hundred yards long and six feet wide, with paths between. Across these beds were sown the seeds on trial, four to five rows of each, and upon the entire area not a hatful of weeds.

"Each family of vegetables is planted the same day and under precisely the same circumstances, each trial distinguished by a label bearing specific numbers; these recorded in a book giving date of planting and origin of sample. Into this book, at proper periods, four series of observations are recorded bearing upon vitality and habit.

"The books of record are volumes of practical systematic observation, and may be seen in the office stacked away, extending far back into the years; ready at all times to testify to the merits or demerits of every vegetable known to the trade."

This is the science of our times, when most is learned by experiment, extended over a long period of time and numerous tests. All conditions and disturbing causes are taken into account, and in this case the whole history of the growth and characteristics of the plant are discovered by means of the comparative method. They know the history and quality of what they sell. The trial ground is at once a "sample room," a "register" of kinds of stock, a "laboratory," a record of kinds sold, with dates and particulars.

The "packing room," to which the seeds are taken, packed, and stored, is two hundred and ten feet long. It is kept clean, dry, well ventilated, at a uniform temperature, and possesses the sweet odor of the harvest. The seed is primarily measured into grain bags and hung up in rows. This is done to avoid the tendency, when stored in large compact masses and consequently away from free circulation of air, to heat, and become mouldy.

In small quantities and for retail sales, seeds are filled into little paper packets, with label, address of the firm, and colored illustration of the plant. These bags are filled by hand, and it is a singular fact that, after numerous attempts, they have, up to the present time, failed to invent a machine to do the work as well. We are tempted to suggest to some of our subscribers to try their inventive skill on the subject.

The girls, however, fill them with wonderful rapidity and accuracy. It is said that any selected at random out of the fourteen or fifteen millions will not perceptibly vary in weight.

Bloomsdale Farm, with its immense annual production of "pedigree seeds," is known to every agriculturist. Landreth & Sons have done more to improve the taste for fine vegetables than any other parties in the Union, and from the manner in which the firm goes steadily forward, yearly increasing the shipments by tons upon tons, their future will be still more remarkable success than their past and present. Next year they complete their one hundred years. We trust they may see a second centennial.

DECISIONS RELATING TO PATENTS, ETC.

United States Circuit Court.—District of Connecticut.

MEYER *et al. vs.* GOODYEAR'S INDIA-RUBBER GLOVE MANUFACTURING COMPANY.—PATENT RUBBER SHOE.

Shipman, J.:

This is a bill in equity to restrain the alleged infringement of reissued letters patent granted to the plaintiffs on November 17, 1874, for an improvement in India-rubber shoes. The original patent was granted to Christopher Meyer and John Evans, as inventors, on February 21, 1871, and was reissued to the same persons on July 16, 1872. Infringement is not denied.

The claim in the patent was for—

"One or more transverse ribs in rubber shoes or sandals, formed by thickening the substance itself in the lines or directions thereof while in the sheets, by means of rolling dies, as and for the purpose described."

Before the invention the edges of the mouth of the shoe were strengthened and made to present a finished appearance by being turned over by hand and cemented. Sometimes cords or strips of rubber were placed by hand upon the edge and were cemented. As a part of the invention, but not included in the original specification, claim, or drawings, the inventors ribbed the edge of the mouth of the shoe with a rib formed in the manner which has been described. The first reissue was obtained for the purpose of including this rib within the patent.

The claim was as follows:

"As a new article of manufacture India-rubber shoes with strengthening or other ribs homogeneous with the substance of the body, formed by thickening up the said substance in the forming of the sheet, substantially as specified."

The validity of the first reissue was then tested in this circuit in the case of *Meyer* v. *Pritchard*, which was tried before Judge Blatchford (12 Blatchf., C. C. R., 101). The court held that there was no patentable novelty in the invention in view of the patent granted to Silas C. Hyatt and Christopher Meyer, January 17, 1854.

The first and third claims of this patent were as follows:

"1. Producing a shoe sole or other analogous manufacture in India-rubber or gutta percha in one piece, having variety of thickness in its different parts, by the use of rollers whose surfaces present the reverse of the forms to be produced at a single operation, substantially as herein described.

"3. We also claim such soling or analogous manufacture in continuous sheets, at one operation, by rolling, as described."

The present reissue was thereupon granted, in which the claim is limited to the rib around the mouth of the shoe, and is in these words:

"As a new article of manufacture, India-rubber shoes having a strengthening rib around the top or mouth of the shoe (whether with or without similar ribs on other parts of the shoe), formed not by turning over the edge or lapping one piece upon another, but thickened up from and homogeneous with and forming a part or portion of the body of the upper, substantially as specified."

Divers defenses are set up in the answer. The two which are relied upon are the invalidity of the reissue, because it is for a different invention from that described in the original patent, and lack of patentable novelty in view of the Hyatt and Meyer patent of 1854.

The court now holds that this second reissue is invalid, and for the same reason given on the trial of the first reissue, namely, double use, as shown by the Hyatt and Meyer patent of 1854.

The decision in *Meyer* v. *Pritchard* upon the reissue then before the court to the effect that the alleged invention covered thereby of forming thickened ribs in rubber shoes or sandals by rolling was but a double use of the invention disclosed in the prior patent to Hyatt and Meyer—viz., forming the soles of rubber shoes of different thicknesses by rolling—*Held* to govern this case, the present reissue only differing from the former in being specifically limited to ribs around the mouth of the shoe.

A reissue may include matter shown in the model which was not described or indicated in the original specification or drawing; and it seems that the character of a lost or destroyed model may be established by oral testimony.

Argument against the propriety of holding that the claim of the present reissue was not patentable by reason of the earlier patent is argument against the propriety of the decision which was made in the Pritchard case.

The bill is dismissed.

United States Circuit Court.—Southern District of New York.

GARDNER *et al.* v. HERZ *et al.*—PATENT CHAIR SEAT.

Wallace, J.:

This action is brought to restrain the infringement of Reissue Letters Patent No. 9,094, dated February 24, 1880, granted to the assignee of George Gardner for an improvement in chair-seats.

Reissue Letters Patent No. 9,094, for a chair-seat made of laminæ of wood glued together, with the grains in one layer crossing those of the next, concave on the upper surface, convex on the lower surface, and perforated, examined and found to present no patentable novelty over the patent to Mayo, granted December 26, 1865.

Merely giving the well known concave or dishing shape by an old process to a chair-seat formed of the materials covered by the Mayo patent is not invention. It is merely applying a process that is old to a material that is old to obtain an old form.

United States Circuit Court.—Southern District of New York.

COBURN *et al.* *vs.* SCHROEDER *et al.*

Wheeler, J.:

This cause has now been further heard upon motion of the defendants to have the decree opened and leave granted to put in as further defenses to the patent an English provisional specification, left by James Ritchie Butchard, January 22, 1866, at the office of the Commissioner of Patents in England, with a petition for a patent, and other evidence of prior knowledge and use. The invention is understood to have been made in February, 1866.

Motion to have a decree opened and leave granted to put further defenses to the patent denied where it appeared that the new evidence would not affect the result.

An invention is not patented in England, within the meaning of the third division of section 4,920 Revised Statutes, until the completed specification has been filed.

An English provisional specification is not a bar to the grant of a patent in this country, and when relied on as a printed publication under section 4,920 Revised Statues it seems that the defendant must show that it was actually published before the date of the patentee's invention.

Motion for opening a decree on account of an alleged change of issue made by the filing of a disclaimer by the patentee, denied where it appeared that the effect of the disclaimer was merely to limit the claim of the patent and the issue, and where the parties had full opportunity to try, and diligently availed themselves of the opportunity to try, the question which would be open if the case should be again opened.

United States Circuit Court.—Southern District of New York.

HOLLIDAY *et al* *vs.* PICKHARDT *et al.*—PATENT 250,247.—ROSALINE COLOR.

Blatchford, J:

On a motion for a preliminary injunction, question being raised whether the patentee's description would make the product claimed by him, and it appearing that this point was decided in favor of the patentee by the Patent Office on a direct issue between him and another patentee whom the defendants represented, *Held*, for the purposes of the motion, that the product claimed could be obtained by following the description of the patent.

The successful party to an interference is entitled to preliminary injunction against the representatives of the defeated party in case the infringement is clear, and the decision of the Patent Office in an interference between the parties as to the identity of the products sufficient proof of infringement.

Nathan Rixford.

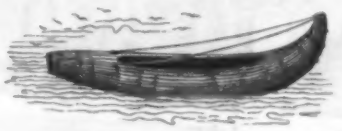
Mr. Nathan Rixford died in Hartford, Conn., August 29, at the age of sixty-seven. He was, at his death, probably the oldest living representative of the silk culture and manufacture in this country. He started the first silk manufactory in Mansfield Hollow, Conn., where he was a manufacturer for more than thirty years.

Correspondence.

Balsa of Lambeyeque.

To the Editor of the Scientific American:

The Indians of Lambeyeque, Peru, use a canoe called the lambeyeque balsa, which I believe would go over Niagara Falls with perfect safety. It will dance on the top of the highest wave or even spray when the wave breaks into foam, and is impossible to submerge or upset except for a moment; its material, being two bundles of reeds, lashed together longitudinally, and its peculiar shape rendering it secure against either mishap. It is broad in the center and tapering at each end, with the bow turned up like a skate. If turned upside down this curved bow will point downward in the water, and being composed of hollow reeds the least motion will make it seek the surface and throw the balsa on its beam ends, which position it could not maintain. The center width being double its thickness, it will immediately right itself. It is amusing to see one forcibly held in an inverted position and then released; the instant restraining power is removed, it will turn upright in the fraction of a second. Between the two bundles of reeds there is a hollow space covered with water tight skin. In the Peruvian balsas this space is small, but it might be made large enough for a man to lie



down in. In the case of going over Niagara Falls (supposing any one was foolhardy enough to attempt it), a line might be attached to the bow and extend to the shore below the Falls, in order to draw the navigator ashore after his descent. A dog recently went over the Falls without being killed, and in 1829 (I think that was the date) the famous ship Niagara was sent over, having on board two bears and a quantity of geese. The geese took flight when the ship went over and alighted in the river below; one of the bears was never seen afterward, but the other swam ashore below the falls with a broken leg. The ship itself was completely demolished. So the transit is not *certain* death.

To convey a better idea of these Peruvian balsas, I subjoin a sketch. W. B. W.

Milwaukee, Wis.

True Disinfectants.

Many a so-called disinfectant is employed to-day in a certain solution, when it does not possess any value whatever under the circumstances. If it is really our intention to disinfect wounds, we must be certain, at least, that we will achieve our object with the remedy we use; if such is not the case, we only irritate without doing good.

The Imperial Board of Health in Berlin has published a number of experiments which have been made by Dr. R. Koch, with the view of establishing the real value of many so called disinfectants. It would lead us too far to give the whole procedure employed to ascertain the facts mentioned, and we will, therefore, confine ourselves to giving the more important results of the investigations of this celebrated physician.

Most surgeons have been satisfied to wash their hands and clean their instruments with a 2 per cent solution of carbolic acid. Such a solution is almost inert, and a 5 per cent solution is necessary to achieve the desired object.

But what is the most interesting is the fact that *carbolic acid dissolved in oil or water proved itself totally inert!* What do our surgeons who still make use of so-called carbolized oil say to that? Koch found that carbolic acid, when dissolved in oil or in alcohol, had not the slightest influence on the vitality of any of the micrococci or bacilli.

Concerning sulphurous acid, it was found to be powerless against spores; bacilli and micrococci, when exposed to the fumes in a box, were killed within twenty minutes, but were very little influenced, or not at all, when exposed to the fumes in a room at the usual temperature.

Chloride of zinc showed itself just as harmless. A 5 per cent solution exerted absolutely no influence on the spores of anthrax, notwithstanding the same had been exposed to the action of the remedy for a period of thirty days.

Of other drugs, the spores of the bacilli were killed by chlorine water, fresh prepared; 2 per cent bromine water, 1 per cent aqueous solution of corrosive sublimate, 5 per cent solution of permanganate of potassium, 1 per cent osmic acid, within one day; formic acid, four days; ol. terebinth, five days; solution of chloride of iron, four days; 1 per cent arsenious acid, 1 per cent quinine (water with muriatic acid), 2 per cent muriatic acid within ten days; ether within thirty days.

Inert or possessing very little influence: distilled water, alcohol, glycerine, oil, sulphur-carbon, chloroform, benzol, petroleum-ether, ammonia, concentrated solution of common salt, bromide and iodide of potassium, 1 per cent; sulphuric acid, sulphate of zinc and copper, alum, 1 per cent; perman. of potash, chromic acid, the chromates and bichromates, chlorate of potash, 5 per cent; boracic acid, 5 per cent; acetic acid, 5 per cent; tannic acid, 5 per cent; benzoate of sodium, 5 per cent; quinine (2 per cent in water 40, alcohol 60), iodine (1 per cent in alcohol), thymol (5 per cent in alcohol), salicylic acid (5 per cent in alcohol, 2 per cent in oil).

As regards remedies which prevent the further development of spores, the following results were obtained. The first number means retarding the development, the rest totally preventing it:

Corrosive sublimate,	1 : 1,600,000	1 : 800,000
Oil of sinapis,	1 : 800,000	1 : 3?,000
Arsenite of potash,	1 : 160,000	1 : 10,000
Thymol,	1 : 80,000	
Ol. terebinth,	1 : 75,000	
Hydrocyanic acid,	1 : 40,000	1 : 8,000
Oil of peppermint,	1 : 33,000	
Chromic acid,	1 : 10,000	1 : 5,000
Picric acid,	1 : 10,000	1 : 5,000
Iodine,	1 : 5,000	
Salicylic acid,	1 : 3 ?0	1 : 1,500
Permang. of pot.,	1 : 3,000	
Muriatic acid,	1 : 2,500	1 : 1,700
Camphor,	1 : 2,500	
Eucalyptol,	1 : 2,500	
Benzoic acid,	1 : 2,000	
Borax,	1 : 2,000	1 : 700
Carbolic acid,	1 : 1,250	1 : 300

But as, for purposes of disinfection, the micro-organisms must be killed, and in the shortest possible period, and the effect of retarding the development of the spores (antiseptic) is not sufficient, only the following remedies can, according to Koch's experiments, be said to be of value: corrosive sublimate, chlorine, bromine, iodine. Bromine in form of vapor is, as concerns rapidity of action, superior to chlorine and iodine.—*Med. and Surg. Rep.*

National Telephone Association.

The National Telephone Exchange Association held a convention in Boston, September 5 and 6. The committee on Central Office System and Apparatus Exchange Statistics reported that reports had been received from eighty-one exchanges, representing some 29,000 subscribers. There are about 60,000 to 70,000 subscribers in the United States. In New York there are 2,878, and the smallest number in any one place is 10. There is a steady and continued growth all over the country. The number of connections increase each month at all localities with improved service.

In an informal discussion of line construction and maintenance, Mr. E. S. Babcock, of the Evansville (Ind.) Telephone Exchange Company, gave an interesting account of 400 miles of wire maintained by his company and worked successfully without insulators of any kind, by simply attaching the wires to the poles. He said no difficulty was experienced in sending messages, and it was found that the wires thus situated worked better than those insulated.

W. D. Sargeant, of Brooklyn, from the Committee on Electrical Disturbances, read a comprehensive paper treating of three subjects—leakage, induction, and earth and atmospheric currents—saying that the increasing number and length of wires prove the value of good insulation and conductivity. No loose or unsoldered joints should be tolerated on a telephone line. The great enemies to long lines are induction and retardation. The latter appears to be the most difficult to remove. In so-called anti-induction cables retardation is most manifest. When inductive shields entirely inclose the insulated conductor the metallic current appears to remove much of this trouble. A cable, the longest in this country, has been recently laid from Newark, N. J., to Jersey City, some ten miles. The conductors in this cable change their relative positions at every joint of about 1,000 feet, and the remedy seems to be effectual, conversation on a single grounded circuit being carried on without interference with others, and the sound of several Morse wires working from batteries and dynamos was scarcely audible. As to earth and atmospheric currents, it is believed that with well-insulated lines of non-magnetic material a degree of perfection may be attainable that will leave but little to be desired.

There were present at the several sessions representatives of principal exchanges throughout the country, and quite a number of practical papers were presented.

The National Geological Survey.

Hitherto the surveys conducted by United States geologists have been confined to the Territories. Last winter Congress authorized the prosecution of such work at national expense within the lines of the States. Accordingly parties are now at work in North Carolina, Kentucky, Missouri, and Arkansas, under the direction of the Chief of the National Survey, Professor Powell, obtaining data for a geological map of the entire country. Meantime the territorial surveys are not neglected, Professor Powell going to join the large party at work in Arizona and New Mexico. The Bureau of Ethnology has several parties at work in the Mississippi Valley.

National Museum of Hygiene.

Surgeon-General Wales, U. S. N., describes, in an official circular, the scope and plan of the National Museum of Hygiene, organized under the Bureau of Medicine and Surgery, at Washington. The design is to make the collection one that will illustrate the entire scope of sanitary science, to have courses of lectures by capable sanitarians from all parts of the country, and to establish a library of sanitary science, accessible to all engaged in the study of this branch of knowledge. The library of the Bureau already contains many standard works in English, French, and German. The support of the Museum has been provided by act of Congress.

IMPROVEMENT IN STEAM BOILERS.

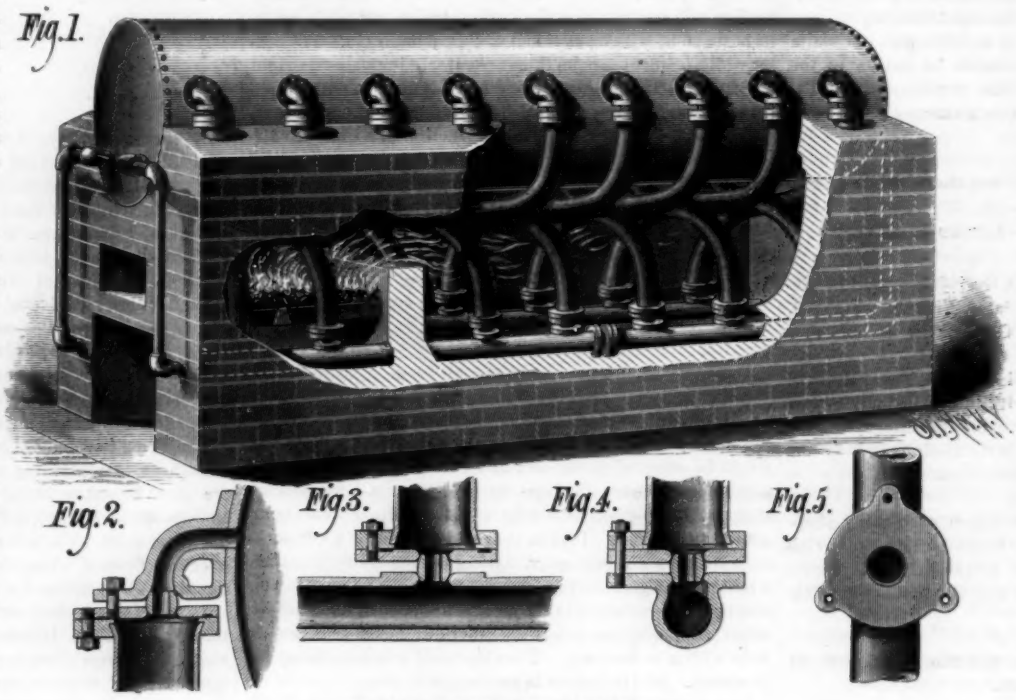
We give an engraving of an improvement in boilers lately patented by Mr. S. L. Hill, of 68 South Fourth St., Brooklyn, N. Y. In this boiler the inventor, by adding external water tubes, utilizes a great amount of heat that usually goes to waste, and thereby increases the capacity of the boiler without increasing the quantity of fuel consumed.

The boiler not only has this economical feature, but it is made safer and more durable by the addition of the water tubes. If the water contains any foreign matter likely to form sediment, it will be deposited in the horizontal pipe below the fire line.

Steam made in the tubes passes directly to the steam room of the boiler, and water is supplied to the water tubes by pipes leading from the water space of the boiler at each end. The curved tubes offer considerable protection to the fire sheets of the boiler, as they come between the fire and the boiler, and prevent the bottom of the boiler from being burned. This is especially advantageous where the feed water is very impure.

One of the principal advantages of this boiler is the facility with which it may be put together or taken apart. The ends of the water tubes are expanded into wrought iron flanges, to which cast iron reducers are secured by ordinary bolts, as shown in the sectional view. The joint is formed by two such reducers, connected by a double cone hollow plug, upon which the reducers are clamped by the coupling bolts. The peculiar form of the plug renders the joint similar to a ball and socket joint, and insures a tight joint, while allowing the pipes to expand and contract.

It will be noticed that none of the joints are exposed to the fire; they are consequently never corroded, and may be taken apart and put together whenever necessary without injury and without creating leaks. The great capacity of this boiler, its safety, and economy are points worthy of the notice of steam users.



HILL'S IMPROVED BOILER.

IMPROVED SPINNING FRAME.

The accompanying engraving represents a perspective view of a new spinning frame—double sided—built by Philip Townson, of Thompsonville, Conn., and tested one entire week in the spinning department of the Hartford Carpet Company, in Thompsonville. The view is taken from the "geared end," and presents the most important acting portions of the machine.

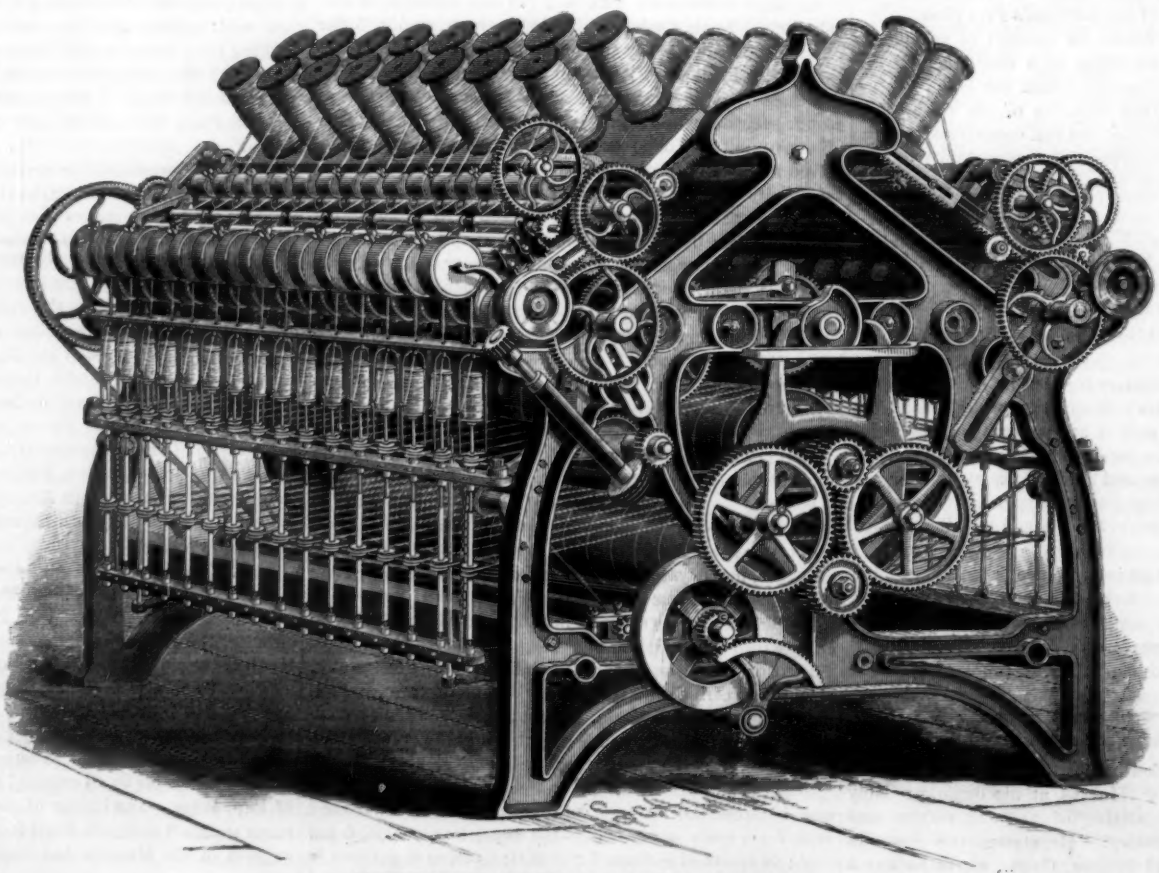
The design of this improved spinning frame is to allow the use of softer twisted yarn than is now possible by the usual spinner; to reduce the amount of waste by breakage of the "ends;" to allow of either filling or warp to be twisted on the same machine; to equalize the strain on the yarn, whether the bobbin be small or large, or "thin" or "full;" and to increase the production of yarn from roving, not only by saving, but by speed.

The Townson spinning frame does not depend at all for the revolution of its bobbins on the tension and centrifugal speed of the yarn and the flier; but the flier has its own independent whirr and cylinder, and the bobbin spindle has also its own independent whirr and cylinder — both plainly seen in the engraving, the two cylinders, one over the other, in the center of the frame, and the two series of whirrs shown on the face or front view.

As the bobbins fill up and increase their diameters, a cam, shown plainly in the engraving on the front, that makes one complete revolution in once filling—or for once doffing—changes the feed gears, which are fixed on a rocking frame, disengaging a large or fast pinion, and engaging a smaller or slower pinion. This change is entirely automatic, and may be closely governed to suit differing sizes of bobbins, by changing the sizes of pinions on the oscillating frame, just as such changes are made on the ordinary drawing frame in the cotton factory to equalize and determine the weight of the yarn. In fact, this machine *can* be used in that way as a determinate measure of the size of the yarn.

The advantages of the new machine have been suggested by former items; but it may be stated that while a speed of feeding roller of 20 feet per minute is all that the ordinary spinning frame can deliver, this one delivers not less than 37 feet—a speed that may be extended to 45 feet. This increase will double, and more, the capacity of this spinning frame. The machine is an evident improvement on anything now in use for producing either filling or warp yarn of woolen for carpet or other purposes.

The inventor is Philip Townson, of Thompsonville, Conn.



TOWNSON'S NEW SPINNING FRAME.

Utilization of Smoke.

At Elk Rapids, Mich., is a blast furnace, in which are manufactured 50 tons of charcoal iron per day. There are 25 charcoal pits, constructed of brick. Each pit is filled with 100 cords of hard wood and then fired. The vast amount of smoke from these pits, which was formerly lost in the air, has now been utilized by Dr. Pierce. Chemical works have been erected, which are thus described by the Boston *Courier:*

First, they have a circular tube made of wood, with pine staves, 16 feet in length, bound together with heavy iron hoops. This tube is placed directly over the pits in a horizontal position, with an opening from each pit into the tube. At the end nearest the building there is a large drum containing a rotary fan propelled by machinery, the power of which is gas. That acts as a suction or draught for the smoke, which is conveyed into five stills filled with copper pipe, 2½ inches in diameter. The boxes in which the pipes are situated are 20 feet square, 8 feet deep, made of heavy pine, and filled with cold water; these are all connected by copper pipes; they are connected with the main still, 100 feet in length, 10 feet wide, 8 feet deep, filled with copper pipes, 2½ inches in diameter, in a horizontal position, surrounded with cold water; from this conveyed to a purifier, from which runs what is called pyroligneous acid, which is as clear as amber, with an unpleasant odor. From the acid is produced, first, acetate lime; second, alcohol; third, tar; the fourth part produces gas, which is consumed under the boilers. Each cord of wood contains 28,000 cubic feet of smoke; 2,800,000 feet of smoke handled every twenty-four hours, producing 12,000 pounds acetate of lime, 200 gallons alcohol, 25 pounds tar. These articles have a commercial value in the manufacturing of various articles. The alcohol has been contracted to a firm in Buffalo, N. Y., for five years, they furnishing the packages and receiving it at the works at 80 cents per gallon. The smoke from 40,000 cords of wood consumed per annum is thus made a source of much profit, as the works are nearly automatic.

A Cheap Railway.

There is now at work an interesting miniature railway—five miles in length—which unites the village of Westerstede in East Frisia with the station of Ocholt, on the Oldenburg and Seer line. It is solely due to the enterprise of the thinly-scattered population of the district, and carries their cattle and other produce to market, bringing them back their few requirements. The soil is marshy, so that a good deal of drainage work had to be done, and it was necessary to carry the line above the level of the frequent floods. In spite of this, the cost of construction was only £2,103 7s. 6d. per mile; and the cost of working (including wages, fuel, and every expense) amounts to the magnificent total of £1 7s. 6d. per diem. The buildings consist of a shed at each end of the line; the terminus is the courtyard of the principal inn at Westerstede, and the single station—half way along the line—is the house of a gentleman, who hospitably entertains the passengers while they are waiting for the train. The rolling stock comprises two small four-wheeled tank locomotives, weighing (when in working order) seven and a half tons each; three carriages of the American type, with a door at each end; two open goods trucks and two covered. A train consists of the engine and two vehicles, between which the guard sits. There are no turn-tables, so that the locomotive is at the hinder end of the train in returning. The fuel employed is turf, which is abundant in the district. The receipts of this tiny railway are steadily increasing.

THE best time ever made on the western division of the New York Central was accomplished September 4, in a run from Syracuse to Buffalo, 150 miles, in 3 h. and 4 m. It was an express train, late from Albany. Between Syracuse and Buffalo stops were made twice for water, and once at Rochester for passengers.

The Alligator Industry.

The business of killing and catching alligators gives occupation to many persons in the South. According to the St. Louis *Globe-Democrat* the hide of a large alligator is worth from one to two dollars. It is almost a day's task to skin a large one. Alligator oil has quite a reputation as a remedy for rheumatism. It has, however, a most unpleasant smell, unless properly treated. Many fishermen have been known to eat portions of the meat, that of the tail being said, when cooked, to have much the appearance of veal and to taste something like pork. Quite a lucrative business is that of capturing alligators alive to send away for exhibition. Colonel Williams, when Spanish Fort was made a summer resort, made a contract with a fisherman to fill the hole known as the alligator pond for him, and in the course of a couple of weeks he had it stocked with thirty or forty, ranging in length from 6 inches to 7 or 8 feet. The man who caught them showed no fear in handling the huge reptiles. With a companion he would capture and bring into camp an alligator 16 feet long.

The manner of accomplishing this feat was, as he explained, quite simple. The old are savage and will fight for their young, and this fact is taken advantage of. Some of the young are caught out of the spot in which the old one is lying, and a stout noosed rope is then placed where to emerge she must thrust her head through it. When all is ready the young are allowed to cry out, and the old one thrusts out her head to have her neck caught in the noose. She is dragged around in the water until pretty well choked, when another noose is secured to her tail, and she is firmly strapped, stomach downward, on a wide board, which she cannot break, as her powerful muscles in the tail act only in a lateral direction. Her head is then fastened to the boat, the noose about her neck is removed, and she is towed away after her young have been placed in the skiff.

Young ones are bought by dealers for from $2 to $4 a dozen, if not over a foot in length. When they sell them they get a much higher price, as they are hard to preserve alive. The large ones are sold differently, there being an increase in price of 50 cents to $1 for every additional foot over a certain length. Alligators 16 or 18 inches long are frequently found by the dozens in shallow water, and can be handled without trouble, providing the old one, who is generally near, does not take alarm. Most alligator fishers are usually turtle hunters also, and search along the shores of bayous and lagoons for the holes of the animals. When the hole is discovered it is explored with a long pole with a big hook set in the end, and if the unfortunate resident is at home he is promptly dragged out in spite of his struggles and quickly appears in market. The eye of a young alligator is a queer and pretty sight, having the fire and appearance of an opal of a similar size.

Embalming.

Experiments have been made at the New York morgue to test a process by which it is claimed dead bodies, though badly swollen and decomposed, can be restored to something like a natural appearance, and preserved so that it will be recognizable after months of burial. The subject operated upon was the corpse of an unknown woman who had died from erysipelas. It was soft, black and blue, and out of all human proportions. An incision was made in the right leg and an embalming fluid injected into the femoral artery. In less than half an hour the body assumed its natural size, became harder than in life, and as the degree of hardness increased the discoloration disappeared, leaving it of a marble whiteness. The body of a man, operated upon seven weeks before, had been kept unburied without decomposition. It retained a natural appearance, and was without odor.

A flywheel, said to be the largest in the United States, has been built by Watts & Campbell, of Newark, N. J., for Clark's Thread Works, of that city. It is twenty-five feet in diameter, with a face of seven feet six inches. It has three crowns for three belts, each twenty-four inches wide. It weighs 49 tons.

THE NATURAL REDDENING OF WATER.

In human societies the persons most in sight are rarely the most useful. The obscure workers, the humble and the ignorant, are in reality the ones who render the most service. It is the same in animate nature; among living beings it is the smallest, the least well known, that play the greatest role in the world. The formation of certain continents is the work of microscopic organisms which, for a long series of ages, have worked without relaxation at the bottom of the seas. In our brooks and our stagnant waters, in the air that we breathe, upon the earth that supports us, in the interior of our own bodies, and in that of the higher animals, magnifying apparatus reveal to us the presence of myriads of microbes which are accomplishing in silence gigantic operations. Invisible agents for reducing organic matter, they decompose the carcasses of animals, as well as dead plants, and cause their elements to serve for the elaboration of a new life. Like those ghosts that superstition has engendered, we are all born, in fact, as in a cemetery, partly formed from the *débris* of generations that have passed away. This circulation of matter, which renders us a portion of the past and connects us with the future, is effected through the innumerable legions of animalcules and microphytes that surround us. Of these, there are some, indeed, that enter our blood and our tissues, and bring about contagious and frightful diseases.

However infinitesimal are these little beings with respect to ourselves, they are worthy, then, of fixing our attention. To him who studies them they offer every day a new surprise. We find them, in fact, indefatigable actors in the drama of life, in a large number of natural scenes whose splendor and novelty excite our admiration. Such is the magnificent spectacle of the phosphorescence of the sea. I have had the good fortune to witness several times during the last two years a phenomenon none the less curious, in the tanks that serve for watering the Jardin des Plantes, at Paris. This was the conversion of the water into—I was about to say wine, so similar to the latter in its beautiful red color was the water that I had observed a few days before perfectly clear. Nothing could have allowed the extraordinary change that occurred to be foreseen. Great was my surprise, then, when I found that the entire liquid, from the lower part of the tank up to the surface, was strongly tinged with red. Drawn up by means of a pipette from different depths, it everywhere exhibited the same appearance. When poured into a glass it exhibited by either reflected or transmitted light almost the same aspect as a solution of fuchsine. And yet, far from being cloudy, far from holding the least visible particle in suspension, it was absolutely limpid. The microscope caused the prodigy to vanish; for, on examining a drop of the bloody fluid under a magnification of 500 diameters, although I found it as hyaline as normal water, I discovered in it clouds of red organisms in motion, as numerous as the stars in the heavens. Nothing can give to one who has not seen it any idea of so immense an overflow of life in so small a space. The restlessness of these animalcules was extreme; pressed one against another, they swam with wonderful rapidity in all directions in the liquid, some turning over and others moving in a spiral or describing fantastic sinuosities and endless gyrations. The apparent coloring that the water exhibited to the naked eye was due, then, to the multitude of living beings that it contained. Fig. 1 shows these curious little animals as I observed them in the water. They are very different from the algæ (*Hematococcus nivalis*) which, according to Ehrenberg, sometimes color mountain snow red. They approach, rather, the nudoflagellate infusoria, and I refer them, in fact, to the group of monads, although the organism, *Monas okenii*, Ehrbg., with which I identify them, has not offered me all the characters now attributed to that group. I have been enabled to cultivate them, follow their movements, and then to reproduce artificially in the laboratory the phenomena that they give rise to in nature. My object in making them known is to incite others to researches of the same kind; for I feel only too well the imperfection of my own, and the great interest it would prove to science to have them completed by more extended observations. It has doubtless happened that many persons have been struck with the singular coloration that the water of ponds in the country takes on at certain seasons of the year. Were the liquid submitted to microscopic examination there would probably be observed in it an infinity of animalcules analogous to those whose evolution I have endeavored to determine.

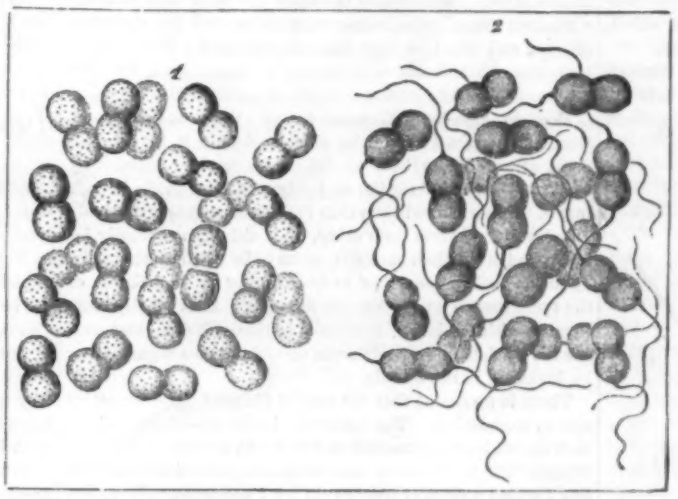


Fig. 1. *Monas Okenii* in the course of active division.—Fig. 2. The same colored by Paris violet. (Magnif. 530 diameters.)

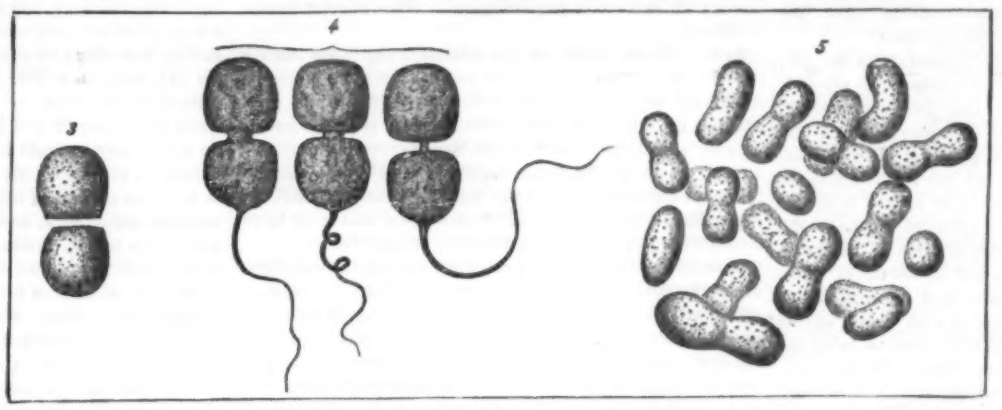


Fig. 3. *Monas Okenii*, not colored, and considerably magnified, so as to show the apparent interruption produced by transverse scission.—Fig. 4. The same colored by Paris violet, and considerably magnified to show transverse scission.—Fig. 5. *Monas Okenii* exhibiting a not very frequent division. Protoplasm colorless, containing extremely fine granulations. (Magnif. 530 diameters.)

It would prove very important for biology in general to gather precise facts as to the development, mode of nutrition, and reproduction of those beings that represent living matter naked, so to speak, and consequently life itself in its simplest state, in what it possesses of absolutely essential.

Unfortunately, when we wish to study these little organisms in all the phases of their existence, a great difficulty presents itself, for the liquid which contains them is soon invaded by a foreign population which disputes with them the empire of the water; infusoria, bacteria, micrococci, diatoms, and algæ of all kinds multiply therein, and, through their rapid and abundant development, exhaust the nutritive qualities of the medium. In this contest for existence the microscopic animalcules, whose modification it was proposed to detect, soon succumb, and it becomes impossible to continue the observation.

I have overcome such a drawback by doing the planting in liquids that have previously been deprived of germs by heat and afterward preserved from contact with the air in vessels inaccessible to atmospheric dust. Experience had taught me, in fact, that monads are great consumers of oxygen. It became necessary, then, to open the door to the outside air, and to close it against

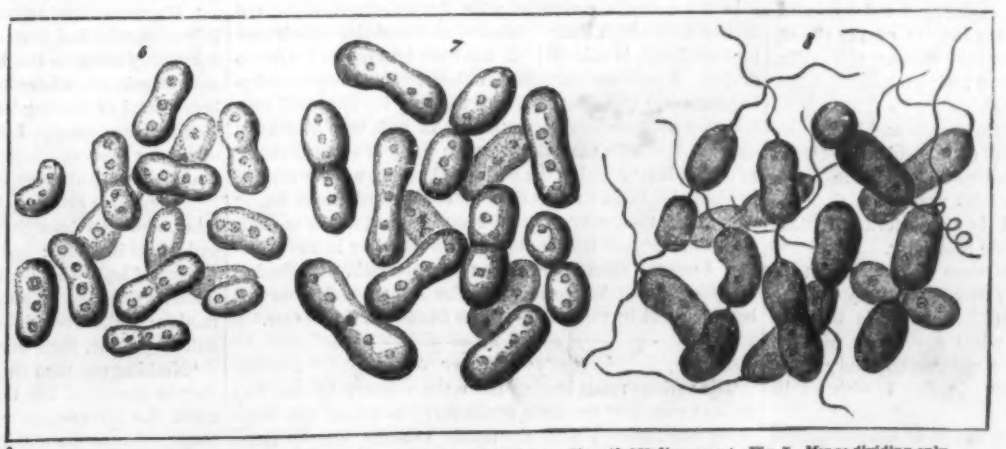


Fig. 6. *Monas Okenii*, showing a not very frequent mode of division. (Magnif. 530 diameters.)—Fig. 7. *Monas* dividing only after having acquired a large size.—Fig. 8. The same colored by Paris violet.

that heterogeneous army of spores that it always holds in suspension in houses, inhabited rooms, and especially in laboratories. The use of the Pasteur *matrass* has enabled me to attain such conditions for success.

This vessel (Fig. 9) consists of a small flat-bottomed glass flask, the neck of which is covered with an emery-ground cap that tapers above into a tube of small diameter filled with cotton. After introducing into twenty of these flasks the liquid found proper for the development of the monads, I close each one with its cap and put it into a stove provided with a regulator. In this I keep them for five hours at a temperature of 125° C. All the germs contained in the interior of each matrass, either against the sides of the vessel, in the liquid, or in the cotton wad, are thus destroyed.

The air which, during the cooling, enters the vessel through the tube of the cap filters through the cotton, and deposits the germs with which it is charged on the upper surface

Fig. 9. Fig. 10.

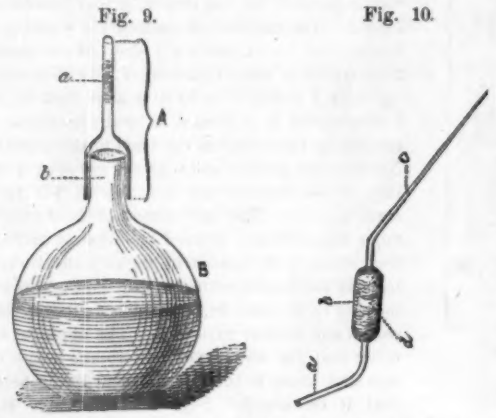


Fig. 9. *Pasteur Matrass.* A, the cap; *a*, wad of cotton; B, the flask; *b*, its neck.—Fig. 10. *Pipette.* *a*, tube for sucking and blowing; *c*, tapering tube serving to introduce the objects into the liquid; *b*, inflated part filled with cotton, *d*.

thereof. The liquid remains, then, perfectly pure, and may be preserved indefinitely in that state. To do the planting it is only necessary to remove the glass cap for a few seconds, and to blow into the flask by means of a special pipette (Fig. 10), previously warmed, a drop of the liquid in which a microscopic examination has revealed the *exclusive* presence of the monads. This operation, when well executed, introduces impurities into only a small number of the flasks. We may say, then, that the results of it are excellent.

As for the liquid with which the matrass is to be half filled for cultivating the monads, it is necessary to select it carefully. Thus, the very water that these animalcules colored red was found improper for such use; the tank that held it contained a large quantity of plants of all sorts that constituted a constantly renewed food for the microscopic organisms, but deprived of such vegetable matter it ceased to be nutritive. The thought then occurred to me to boil the water with the plants and organic detritus of the tank, then to filter it, sterilize it by heat, and to aerate it. This process succeeded very well. I also had recourse to veal bouillon and to Liebig bouillon, diluted with water, adding to it a few drops of a weak solution of potassa to bring the bouillon, of itself acid, to a neutral or slightly alkaline state.

In both cases the monads developed so quickly in the interior of several matrasses that they formed, a few days after being planted therein, a red cloud suspended in the liquid. Thanks to this process, and to cultures tried with less success, it is true, in vessels from whence vital concurrence was not banished, I have been enabled to determine the structure of the monads, and, in these minute agents that redden water, a whole series of interesting transformations whose succession it was of importance to ascertain accurately.

When these microbes are sown in a properly prepared liquid they develop therein in abundance. In the majority of cases they fall to the bottom of the vessel, but sometimes they swim either at the upper part or in the middle of the liquid and form there a very remarkable red zone. Under each of these circumstances they exhibit a peculiar phenomenon. When they form a floating cloud they are always in the course of active division (Fig. 1), their joints are short, their motions are very lively, and in the interior of their body, which is hyaline, are seen numerous red granules. Then they deposit themselves on the bottom of the vessels and cease to divide so actively; but they increase more (Fig. 5), their motions become slower, and their granulations less numerous and especially much finer.

They are found also in the water of ponds and laboratory aquaria in a very agile state around aquatic plants. Growing then enormously, without segmenting, they are much elongated (Figs. 6 and 7), and exhibit very large dark-red granulations, perfectly spherical, in the interior of their bodies, whose mass is then of a pale rose color.

All these transitions from one state to another can be studied by cultures in flasks. We may, even, by possessing one, reproduce the others at will. Thus it is that the elongated form shown in Fig. 7, when sown in a medium rich in nutritive matters, segments very rapidly and gives in a short time the organism shown in Fig. 1, with all its characters.

Microchemical reactions seem to assign to the red globule the role of a reserve material for the organism. They have also permitted me to establish the anatomical characters of the monads, several types of which were studied a few years ago by Prof. Ray Lankester and confounded by that scientist with the bacteria. I have, in fact, been able to convince myself of the absence of a cellulose, ternary, vegetable envelope at the periphery of the body. All reagents that color protoplasm color the external part, and *vice versa*. In alcohol, glycerine, and dilute acetic acid the contraction is general. It is the same during desiccation. The use of Paris violet led me, besides, to discover the existence in monads of organs very different from those figured for bacteria. A very concentrated solution of this reagent brought to light at one of the extremities of the body (rarely at each of them) a filament about twice longer than the rest of the organism (Figs. 2 and 8). It is very delicate throughout its whole extent, exhibits the same refraction as water, and, for this reason, is invisible without the aid of an artificial coloring.

How do these long filaments form? What is their function? I thought I should be able to decide it by coloring them after killing them at different stages of division by osmic acid, which fixes the majority of the infusoria in their forms. I ascertained thus that the two segments of the body which separate from each other, and, although mutually interdependent in their motions, seem to be disconnected (Fig. 3), are in reality connected to one another by an isthmus of the same nature as the caudal filament. It is wholly comparable with the latter, it shrinks in size as it elongates, and it ends by detaching itself from one of the two segments, or by breaking in the middle.

There is no doubt that the caudal filament plays an active role in locomotion. The following is an experiment which well shows how contractile it is: I put a large number of monads into two vessels, each containing distilled water. To one I added a drop of osmic acid (of 1 per cent). Four days afterward I collected the monads and colored them with Paris violet. This reagent brought clearly to light the filaments of the monads, whose forms were fixed by the osmic acid. It did not permit me to see the filaments that the monads that died in the distilled water were enabled to retract freely.

It is not without interest to reflect on what this little mass of albuminoid matter that forms the monad and its flagellum represents with respect to the higher organisms. It corresponds entirely to the protoplasm which constitutes exclusively the living and generating part of each of those innumerable cells of which the body of a man, of a horse, or of an oak consists. All the functions of which this body is the seat are accomplished also in the monad. Only, in the horse for example, the organs are differentiated by the predominance in some of physiological qualities that are weaker in others.

In the *Monas okenii*, on the contrary, the same work is executed by one unicellular and nearly homogeneous body. Although the existence of a locomotive flagellum gives proof of the tendency of the different parts of protoplasm to become specialized, such parts are nevertheless similar enough to act in the same manner. It is due to this simplicity of organization that the microbes can be cultivated in mineral liquids of known composition and serve to determine the physiological mechanism of nutrition.

It would be impossible to dwell too long on the excellence of this method. It is, up to the present time, the only one which allows us to ascertain with accuracy the influence of physical surroundings upon living matter, and the general reactions that it exhibits. It must not be believed, in fact, that the higher animals are alone endowed with contractility and sensitiveness, for these properties belong also to plants, and are common to all living beings. The monads that produce a reddening of water offer a surprising example of this, for they direct themselves toward the light. On observing them in laboratory aquaria I have remarked that they developed themselves preferably against the sides exposed to the light. On this subject I made the following experiment: I poured water rich in monads into glass crystallizers, the whole inner surface of which I had covered with mineral pitch, except one point designed to allow the passage of the light. The vessels were covered with disks of black cardboard. At the expiration of ten minutes a microscopical examination of the water showed me that all the monads had left the dark parts of the crystallizers and concentrated themselves against the little window that gave access to the luminous rays.

Such a phototactism recalls that of chlorophyl bodies. Is it in the monads connected with the existence of the red matter with which their globules, and sometimes their protoplasm itself, is colored? It has been impossible for me to decide. I have not succeeded, either, in obtaining the coloring matter in sufficient quantity to study its chemical constitution and its absorbing power. As it is very soluble in alcohol, it will be easy, the first time water is seen to redden, to obtain it by filtering the water and taking up the residue in alcohol. Such an occasion of continuing, under fitting conditions, the researches that I have begun into the monads will often present itself to naturalists who live in the country. I call the attention of those to it who think, with Fredol, that there is nothing so small to the sight which does not become great by reflection.—*Louis Olivier, in La Nature.*

A City of Water Jugs.

The various roads leading from the country to this city present a curious spectacle in the early morning, the ways being encumbered with numerous vehicles heavily laden with casks and jugs of different sizes, filled with fresh water from the numerous springs in adjoining towns. These jugs are distributed to stores, counting-rooms, and houses in all parts of the city, and the water is used for drinking and culinary purposes in place of the Cochituate water, which is supplied to almost every inhabitant. The empty jugs are picked up by the enterprising water carriers, and returned again filled with the sweet water of the country springs.

The cost of this supply of water is large to individuals, and very large in the aggregate, and the luxury can be indulged in only by those of ample or fair means.

The cause of this amusing display of water jugs in the streets, counting-rooms, banks, restaurants, dwellings, etc., is that an impression prevails that the water supply of the city is not suited to domestic uses by reason of impurities. There has been noticed for many months a disagreeable odor and taste in the water, and protracted discussion has occurred as to the cause of this offensiveness. The resources of science have been exhausted in efforts to discover the cause, but without any satisfactory results. Professor Remsen had the good luck to hit upon a plausible theory, which attributes the difficulty to the growth and decay of fresh water sponges in the ponds or supply basins; but as these sponges exist in considerable quantities in numerous ponds in New England where the water is perfectly tasteless and unobjectionable, the theory has no good grounds to rest upon.

The sponges are found in six or eight ponds in Essex County, where the conditions are precisely similar to those of the Framingham pond, and no unpleasant results to the water are observable. If the Remsen theory were satisfactory to the water takers, and would have the effect to quiet apprehensions, the labor would not have been lost; but such is not the case.

In one view the condition of the city water supply is greatly exaggerated, and that relates to its possible unhealthfulness. We do not conclude, from the results of many years' observation upon the sanitary influence of New England pond waters, that there is anything contained in Boston water at present which is positively deleterious to health. These country water basins are to a large extent similar in their surroundings, and they swarm with the lower forms of animal life, and large quantities of fish of various kinds are present; but they have no positive anti-sanitary influence. They may confer disagreeable physical qualities, but not chemical.

Boston water contains no impurities which may not be removed easily and readily by mechanical means. The inflowing of water jugs may meet the ends of a conceit, and so far as it is confined to wealthy citizens the conceit is apparently harmless; but poor people cannot afford to purchase water in jugs, and they are excited to alarm by the acts of those who can afford it. The jugs create uneasiness and apprehensions on the part of the mass of the people of the city, without doubt.

By filtration, even by the most simple means, Boston water becomes pure and inodorous, and as good for domestic uses as any brought from springs. The use of ordinary flannel, of several layers, securely attached to a water faucet in the form of a small bag, gives to the inflowing water a colorless appearance, and removes nearly all offending matters. It is better, however, to use a filter of more efficient nature, and this can be of home construction and cheaply made. A cylinder of tin, three inches in diameter and six or eight inches long, filled with alternate layers of clean beach sand and pounded charcoal, answers an admirable purpose. It may be attached to the faucet by a screw obtained from the plumbers, and there should be a delivery tube at the bottom. It is best to have two delivery faucets, one for filtered water, for strictly culinary and drinking uses; and another for supplies for sink purposes and for washing. A filter used only for water for culinary purposes will serve its end in most families for several months, and when it fails of satisfactory service it may be removed, the contents changed, and again put in its place. If some plumber in the city would construct cheap and convenient filters, costing no more than a couple of dollars, on the plan suggested, he would confer a great service upon the poor people of the city and reap a rich pecuniary reward.—*Boston Journal of Chemistry.*

The Parasol Ant.

A correspondent from the London *Field*, writing from the island of Trinidad, W. I., says:

"We were about returning to the boat when one of Mr. B.'s sons, who had been some little distance away from us sauntering about in the bush, called to me to come back, and, on going to where he was, he pointed to what seemed a broad band of moving leaves right across the path, and, on looking more closely, I saw we had met with one of those enormous swarms of the "parasol ants," which are so destructive to plantations in the tropics.

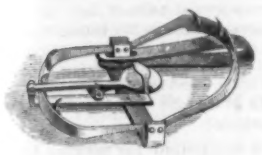
"They were crossing from one side of the wood to the other, and were traveling in a column of more than a foot and a half in width; and as each insect carried in its mouth a piece of leaf, which entirely covered the body, they presented a singular appearance, like a Lilliputian grove in motion; and, although we watched them for some time, still they came, their numbers seeming to be inexhaustible.

"Nothing can turn them from their course; and although they be destroyed by the thousands, enough will swarm upon the intruder to make him repent interfering with them. On the mainland of South America I have known a fruit tree stripped in a single night by a swarm of these ants."

RECENT INVENTIONS.

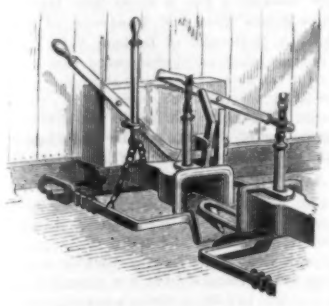
Hamilton's Animal Trap.

An animal trap, especially adapted for catching otter as they slide down their "snow slides," has been patented by Mr. Erastus H. Hamilton, of Community, N. Y. The body of the trap is made with two jaws and a flat U-shaped spring in the usual manner, as shown in the engraving. A series of sharp, strong teeth are held by rivets to the under sides of the jaws, in such a manner that they project from the adjoining edges of the jaws and lugs that project each side of the teeth serve to hold them more firmly. A platform, secured on top of the pan of the trap, stands higher above the ground than the ends of the teeth when the jaws are set open. The trap is placed in the "snow slide," and as the otter passes over it on his belly, the platform is pressed down and the trap sprung. As they slide rapidly, and the fur is soft and yielding, they slip out of ordinary traps, and the jaws must be provided with sharp teeth to catch them.



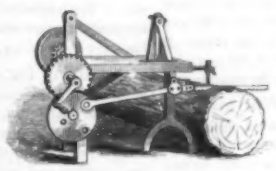
Improved Car Coupling.

Mr. John C. Look, of Yuba City, Cal., has recently patented improvements in car couplings consisting in combining with a draw head of the usual construction, of a swinging guide plate, which is attached to arms pivoted to a cross-piece secured on the draw head. The guide plate is drawn toward the cross piece by springs attached to the arms and the cross piece, that serve to hold the guide plate to the front of the draw head when it is raised. The coupling pin is suspended from a lever, which is held raised by means of a trigger lever, connected with the cross bar of the draw head. When the cars come together, the link is guided by the guide plate into the draw head, then the guide plate drops, and the trigger lever is moved and the pin drops through the link and the car is coupled. The pin is raised to uncouple by means of the lever that suspends it, the lever reaching to the outside of the car.



Norris Drag-sawing Machine.

Mr. Otho J. C. Norris, of Rohrersville, Md., has patented an improvement in hand drag-sawing machines, by which they are adapted to the sawing of large trees and logs. The saw of the machine is attached to the lower end of a swinging arm, pivoted to a standard on the frame of the machine, in such a manner that it is adjustable up and down to raise or lower the saw. The swinging arm is operated by a connecting rod pivoted to a crank wheel, revolved by suitable cog wheels driven by a crank. The crank wheel of the connecting rod has a series of holes at different distances from the center, by which the length of the stroke of the saw may be adjusted. By these devices the machine is made adjustable to the size and the resistance of the log.



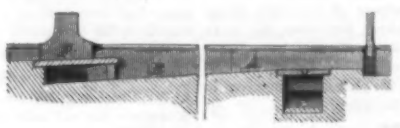
Roeder's Showcase for Needles.

The case for showing needles shown in the annexed cut enables the dealer to so arrange his stock that the several varieties and sizes kept in stock will be exposed to view, and will be readily accessible. The case is constructed with a vertical back, vertical and tapered sides, and horizontal shelves. The shelves are divided into compartments by partitions, and have a glass plate in front of the compartments, so that the papers of needles will be plainly displayed. The compartments are of suitable width to receive the different sized packages. With this case no time will be lost in looking for particular kinds and sizes of needles, as they are arranged in regular order, and can be readily seen. In the bottom of the case is a drawer for the stock that there is not room for in the compartments, and a lid is provided to keep the dust from the stock. The case is patented by Mr. Joseph Roeder, Sr., of 74 Division Avenue, Brooklyn, E. D., N. Y.

Irrigating Ditch.

We give herewith an engraving of an improved irrigating ditch that is so constructed as to prevent filling with sand or other sediment, and also to prevent the sediment from being spread over the land. This is especially important where water enters the ditch from quartz-mills, as the quartz sand is very injurious to arable land.

A is a ditch in which at suitable points are formed depressions, B, the bottoms of which meet the bottom of the ditch upon the up-stream side at a grade much steeper than the grade of the ditch. The down-stream side of the depression is vertical, and the size of the depression depends upon the amount of sediment entering with the water. In the side of the ditch, at the lowest side of the depression, is formed an opening, leading into a branch ditch, through which the sediment may be conducted into a place where it will do no harm. The opening is closed by a gate.



The deeper part of the depression, B, is covered with a plate, F, the under side of which is on a line with the bottom of the ditch, A, so that when the gate is opened the outflow of the water will carry out all the sediment that may have settled in the depression, B, the current being made more effective by the plate, F, that forms a contracted passage through which the water is obliged to pass.

With this improvement the water is made to clear the ditch of sediment. This device has been patented by Mr. Dennis D. McIlvoy, of Golden, Col.

Paper and Pineapple Fiber.

The variety of purposes which paper can be made to serve is every day increasing. A few of the latest of these are worth mention. It appears that thick paper and cardboard can be rendered as hard and horny as papier-mache, by means of a kind of cement called Chinese varnish, which is easily prepared from blood, lime, and alum. With four parts of slaked lime and a little alum are mixed three parts of fresh blood well beaten up. The thick flowing mixture that results is, we are informed, at once ready for application to paper or card.

Among the curiosities of the late Australian Exhibition is stated to have been a house entirely constructed from paper, containing carpets, curtains, dishes, and what not, all made of the same useful material. Whether the dishes aforesaid were similar to the plates and dishes made in Germany, we cannot say; but in that country, we are informed, platters are being manufactured from sawdust and paper in the following manner: Selected plain shavings are bound into bundles, and steeped in a bath of weak gelatine solution about twenty-four hours, then dried, and cut into suitable lengths. Plates are cut of strong paper or thin pasteboard of the size of the objects to be produced. These are moistened with a liquid consisting of weak gelatine solution with sodium water-glass, and pressed in heated metallic moulds. After drying, the pressed paper objects are coated on both sides with an adhesive material made of five parts Russian gelatine, and one part thick turpentine; the shavings are applied to them, and the whole is subjected to pressure. (Wood shavings alone would, because of their unequal thickness, present uneven surfaces.) The objects are now cut if necessary, dried, and varnished.

In a former number of this *Journal*, mention was made of the dome of an observatory having been constructed of paper compressed to the hardness of wood. If buildings can be satisfactorily roofed with what is usually considered so frail a substance, it is not surprising to learn that hats and umbrellas can be made from the same material, a paper of extraordinary fineness and strength being said to furnish the people in the Corea with both of those useful articles.

By some enterprising Americans at least, the time is thought not far distant when yachts, lighter, swifter, and stauncher than any craft yet built, will astonish the maritime world. Not very long ago, a citizen of the United States made a journey of over two thousand miles in a paper canoe, built for him by a firm in New York. The total weight of the canoe was only fifty-eight pounds; and for strength, durability, elasticity, could not, they say, be surpassed. The paper-skin, after being water-proofed, was finished with hard varnishes, and then presented a solid and perfectly smooth surface to the action of the water, unbroken by joint, lap, or seam. Unlike wood, it has no grain to be cracked or split; and paper being one of the best non-conductors, boats of this kind appear to be admirably adapted—which cannot be said of steel or iron—for use in all climates. The surface, polished like a coach panel, never shrinks or absorbs moisture. Once employed by boat-builders, the conclusion naturally suggests itself, that some day a new and hitherto unsuspected meaning may attach to the proverbial phrase of a "paper war."

As regards the raw materials out of which paper is made, the immense commercial importance of cotton and jute as textile products suggest a few important considerations. Within a comparatively short space of time, these fibers have been the means of founding industries which rank by the side of the time-honored silk, wool, and linen manufactures. Is it not natural to suppose that if, in scientific matters—notably electricity—we seem almost daily increasing our knowledge, similar progress should be made with respect to those more prosaic subjects which very closely affect the personal and domestic comforts of mankind? Among the latter, clothing is, after food, the most essential requirement. The discovery or application, therefore, of a new textile fiber is of much economic importance; and the recently published accounts of the properties of the ananas (or pineapple) fiber are sufficient to show that in all probability a very valuable raw material for the manufacture of certain qualities of cloth has been placed within the category of textile vegetable fibers.

The pineapple is justly esteemed in Europe for its delicious aromatic flavor, and when grown in this part of the world, requires to be kept in hot-houses. In the more sunny regions of the East and West Indies, South America, Mexico, and the Philippine Islands, the pineapple grows in wild luxuriance. Yet, however widespread its fame as a table-fruit, it is doubtful whether many people know of the plant in connection with the textile fiber it produces. According to one practical authority, the leaves of both the wild and the cultivated kinds yield fibers which, when spun, surpass in strength, fineness, and luster those obtained from flax. It is further added, that in its manufactured state, this product has been long known as an article of commerce in the countries referred to. One of the leading trade papers of the German textile industry has given attention to the investigation of the properties of this fiber. From India and from Central America, two specimens of tissues woven from it had been received. The former was a piece of striped muslin; and the latter a sample of dress material in which the yarn had been bleached; thus showing that the fiber is capable of undergoing that process successfully. As to the uses to which the fiber can be put, it is asserted that it can be employed as a substitute for silk, and as a material for mixing with wool and cotton. It is likewise stated that for sewing thread, twist, trimmings, laces, curtains, and the like, its particular qualities render it specially applicable.

The large size of the leaves gives a great length of fiber, which is an advantage for manufacturing purposes. It has hitherto been mostly used, in the countries referred to, for the making of fishing nets, lines, etc.; its great strength, and its peculiar quality of not being injured by a prolonged submersion in water, rendering it particularly adapted for such purposes. The fact that every portion of the plant is utilized either as fruit or fiber, has been urged to prove the lucrative results which may attend its cultivation. In conclusion, the writer considers that the ultimate adoption of the pineapple fiber as a manufacturing product is assured, and urges on German manufacturers to devote special attention to this new branch of textile industry.—*Chambers's Journal.*

The Solar Constant.—Boiling Water by Direct Sunlight.

Professor S. P. Langley has submitted to the Chief Signal Officer an abstract of the results of the Mount Whitney Expedition to determine the amount of heat the sun sends to the earth, in technical terms the solar constant. Mount Whitney, in Southern California, was selected for the observation because it combined the advantages of great elevation, extreme dryness of atmosphere, and abrupt rise from the plain. The party of observation consisted of Captain O. E. Michaelis, United States Army; two non-commissioned officers of the Signal Service, six soldiers acting as an escort, four civilian assistants, and Professor Langley. Systematic work did not commence until the last days of August, 1881. Professor Langley summarizes the results ascertained as follows:

"The approximate estimate of the solar constant is from 2·6 to 3·0 caloric, by which is meant that the direct solar radiation before absorption by the earth's atmosphere would in falling for one minute, normally, upon an area of one square centimeter, raise the temperature of one gramme of water 2·6 or 3·0 centigrade. This implies its ability to melt annually a crust of ice covering the whole earth over 150 feet thick. This amount is one half greater than the received value of Pouillet, and greater than the latest determinations of Messrs. Crova and Violle."

On the summit of Mount Whitney an ordinary black bulb thermometer *in vacuo* rose to 180 degrees Fahrenheit, while the temperature in a blackened copper vessel, covered by two sheets of common window glass, rose above the boiling point. With such a vessel water could be boiled among the snowfields of Mount Whitney by the direct solar rays.

While the influence of the atmosphere is to shut off from the earth's surface a considerable portion of the sun's heat by absorbing it, the capacity of the air to store heat and prevent its radiation into space serves to make the earth habitable. Otherwise, in Professor Langley's opinion, the surface temperature, even under the tropics, would be lower than the lowest recorded degrees of Arctic cold. Another effect of the selective absorption of the atmosphere is to change the apparent color of the sun. In a transparent atmosphere the now "golden sun" would appear blue.

ENGINEERING INVENTIONS.

Messrs. Wendell P. and Charles H. Norton, of Thomaston, Conn., have patented improvements in engine valves of locomotives. The improvements consist in a novel system of slide valves, placed in the heads of the cylinders, and restricted respectively either to admitting or exhausting the steam, and such a construction of the chambers that short steam passages are obtained, thus reducing the waste of steam and providing complete drainage for the cylinder.

Improvements in iron railroad ties have been patented by Mr. James H. Meacham, of Petersburg, Va. The improvements consist in an iron tie cut away in its central portion at its sides to allow the tie to settle in the center when the road is "soft," and yielding readily to the pressure at the ends of the ties, and avoiding the danger of breaking. The weight and cost of the tie are also reduced.

Improvements relating to log beams and dogging devices have been patented by Mr. Robert M. Beck, of Westminster, Md. The log beam has on its side vertical recesses that receive dove-tailed fender blocks that protect the beam, and are easily removed and replaced as they are worn. A standard formed of two parallel uprights is secured to one end of the log beam, and constitutes a guide for the block in which the dog is secured. The screw rod that carries the dog up and down engages with a spring actuated block, having a concave threaded surface. When the spring block is drawn back the dog drops, entering the log, requiring less time and labor than when run down by the screw.

Improvements by which the ordinary portable engine is adapted to be used as a traction engine, have been patented by Mr. John A. Miller, of Wadesville, Ind. The engines are fixed in an inclined position on the sides of the boiler, the piston rods extending through both ends of the cylinder, the rods on one end being adapted to take hold of the crank shaft of the band wheel, and on the other end to devices for applying power to the wheels for moving from place to place.

An improved box for the cam shaft of stamp mills has been patented by Mr. Henry Bolthoff, of Central City, Col. In this improvement cushions are interposed both at top and bottom between the cam shaft boxes and their support, whereby the shocks of the cam shaft will be much less injurious to the stamp mill than when the boxes are bolted fast to rigid supports.

A safety step upon which the brakeman can stand, thus avoiding the danger incurred from stumbling over rails or ties in coupling cars, has been patented by Mr. Samuel M. Berry, of Omaha, Neb. The ends of the cars have secured at each side a U shaped bar that extends down from the bottom of the car to near the rail, the sides of the bars being united by a cross rod, forming a step upon which the brakeman stands.

Mr. Antonio Samper, of Paris, France, has patented improvements in apparatus for transmitting motion. In the usual system the belts are subjected to considerable tension in tightening them to increase the power, the tension tending to deflect the shafts; but in this invention the power is increased by applying the belt to more of the surface of the pulleys, thus giving the belts more adhesion, and as a consequence more power. The apparatus is simple and effective.

An improved car coupling has been patented by Mr. Stephen C. Collins, of Oregon, Mo. The coupling pins are attached to vertically swinging tumblers, that are held up in an open position, by a trip dog. This dog is struck by the coupling link, when the cars are run together, letting the coupling pin fall through the link into the lower part of the draw bar, where it has support against the draught. The tumblers are raised by levers extending to the outside of the car, so that it is not necessary to go between the cars to couple or uncouple them.

Mr. George Clef, of Palatka, Fla., has patented improvements in head lights for locomotives The head light is provided with glasses, placed on one or both of its sides, that show any desired colored light, the glasses being illuminated by the ordinary lamp of the head light, whenever covers with which the glasses are provided are removed. These colored lights are used at night time for signaling trains.

Improvements in the construction of concrete abutments, bridge piers, etc., have been patented by Mr. James Burns, of San Antonio, Tex. The abutments are built in sectional moulds, made of planks and battens firmly nailed and held together by bolts and clamps, the moulds being adapted to be placed one above another as the height of the structure increases. The moulds are supported against lateral pressure by rods that pass through the structure, and are removed when the material hardens. Mr. Burns has also patented devices by which artificial stone curbing may be made and hardened in the trenches where it is to remain, thus saving the cost and trouble of setting.

A combined signal and speed indicator for railroad cars has been patented by Mr. Walter J. Kidd, of Logansport, Ind. It consists in a revolving flash signal or target, mounted on the roof of a car or on the front of the engine, that derives its motion by a belt from the axle of the car or engine. When the disk is revolving, it indicates that the train is moving, and the rapidity of its revolutions indicates the speed of the train.

A construction car for railroads has been patented by Mr. Ephraim N. Wing, of Green Bay, Va. A platform car is provided with a horizontal derrick arm on which a traveling block runs, and is also provided with suitable tracks on which hand trucks are moved. Mechanism is secured to the car for moving the traveling block back and forth over the derrick arm, and for moving the car forward on the rails as the work is done.

MECHANICAL INVENTIONS.

A boiler tube expander, consisting of straight cylindrical rolls, set obliquely or spirally in the roller cage, and made without journal bearings at their ends, has been patented by Mr. Zachariah J. Ferguson, of Jackson, Tenn. A guard for preventing the expander from entering the tube too far, and the form and arrangement of the rollers, enables the instrument to expand the tubes more without bursting than is done by expanders in common use.

Improvements in the class of horse power in which a vertical shaft is revolved by power applied to horizontal levers, have been patented by Mr. James T. Graves, of Wilson, N. C. In this invention devices are provided by which the levers are secured tangentially to the shaft instead of passing centrally through it, enabling the animals moving around the shaft to pull at right angles to the levers instead of obliquely. The draught hook is also of such shape that the draught is directly from the end of the lever.

An improved chuck for watchmakers' lathes has been patented by Mr. George R. Metten, of Helena, M. T. The outer end of an ordinary spit chuck is recessed to receive a stepped disk, that is clamped by the contraction of the chuck. The disk is centrally apertured, and has one or more steps on each side, each disk being adapted to receive two or more sizes of work. Disks may be provided for all sizes of work, and all used with one chuck.

Mr. Edwin T. Pettit, of Marshalltown, Ia., has patented a device for perforating paper that is so constructed that the cutting edge of perforator rests a little below the printing surface of the type, so as not to interfere with the inking, but when the press comes together, the perforator is elevated by suitable devices to perforate the sheet a little before the impression is taken, and when the pressure is removed to return below the surface of the type.

AGRICULTURAL INVENTIONS.

Mr. Charles W. Love, of Fairpoint, O., has patented a track clearer for mowing machines. To a coupling hinged to the end shoe of the cutter bar are secured two boards, attached to each other at an angle, and provided with two slightly bent rods, one attached to the rear end of the boards and the other to the hinged coupling. With this clearer the grass is moved back from the edge of the uncut grass, and pressed down upon the stubble.

A device for marking ground, for the purpose of directing the course of driving for a corn planter as it passes to and fro across the field, has been patented by John J. Farrar, of Aurelia, Ia. The marker is attached to the outer end of a guide stick that is pivoted at its inner end in the cross bar of the planter. The guide stick is moved up and down by a hand lever, and is provided with suitable devices for controlling it, and is extended from the side of the planter to reach and mark the ground as desired.

TEXTILE INVENTIONS.

A machine for sticking and scalding naps to felt hats has been patented by Mr. Seymour C. Palmer, of South Norwalk, Ct. A vat has journaled on its upper edges three large cylinders, to the journal of one of which a pulley is attached to receive a driving belt. An endless belt passes over these cylinders and under smaller cylinders journaled near the bottom of the vat, and on the face of the belt are cross cleats. By this device the hats are thoroughly worked and the nap firmly fixed.

Mr. William Chesterman, of Sheffield, Eng., has patented a measuring tape made of fibrous material woven in such a manner that the warp threads shall be alternately over and under one weft thread, and the weft threads shall be alternately over and under two or more warp threads. In this manner of weaving the tape the corrugations in the threads of the warp are slight, and the tape is less liable to contract or expand than tapes woven in the usual manner.

METALLURGICAL INVENTION.

Mr. Horace E. Henwood, of New York city, has patented an improved apparatus for separating gold and silver from powdered ores and fine sand. The amalgamating pan is secured by means of hollow arms to a sleeve on a vertical shaft, and through these arms quicksilver is projected against the inner sides of the pan by means of a fan blower. To the upper end of the vertical shaft is attached a conical plate, upon which the sand or ore falls from a hopper and is distributed against the sides of the pan, thus being brought into contact with quicksilver and amalgamated. Suitable devices are provided for operating the parts.

ELECTRICAL INVENTION.

An improved electric conductor for fire alarms has been patented by Mr. Paulin A. Charpentier, of Paris, France. The conductor is composed of two copper wires, each covered with silk steeped in paraffin. To these wires a third wire is joined, that is made of some easily fused metal, and the three are covered with non-conducting material. Each of the copper wires is connected with one pole of the battery, and when the heat in a room is sufficient to melt the fusible wire, the copper wires are connected by soldering, and a circuit formed and alarm given by a bell in the circuit.

MISCELLANEOUS INVENTIONS.

Improvements in the ornamentation of fur and other goods have been patented by Mrs. Amalia Mayer, of New York city. The improvement consists in inserting in fur or fluffy goods, at numerous points, hairs having beads or "bugles" attached to their outer ends, and also in the material or article thus ornamented. The beads attached in this way add very materially to the beauty of the goods.

Mr. Nels. W. Hawkenson, of Litchfield, Minn., has patented an apparatus for drying damp or wet grain. A fan draws dry air from a suitable source and delivers into the bottom ends of upright perforated tubes, arranged to project up through the grain in a bin. The tubes are closed at their tops, and the dry air is forced through the grain, drying it. By suitable devices the dried grain next to the pipes is drawn off, the damp grain taking its place to be dried.

A clothes washing apparatus, adapted to be used in connection with an oil or gas stove, has been patented by Mr. Dennis McDonald, of Niagara Falls, N. Y. The apparatus consists in a rectangular frame divided by a vertical partition into two compartments, one of which serves as a wash tub, and the other to support a boiler over an oil or gas stove. The boiler is of the fountain kind, and is made narrow at its bottom to give room for the heat of the stove to circulate around it.

Mr. Reuel Barnard, of Tuskeega, Ia., has patented improvements in end gates for wagon boxes. The end gate is constructed in two sections, connected by hinges. The outer ends of the sections are provided with hooks that engage with staples in the ends of the side boards, in such a manner that the hooks pass behind the ends of the staples, when the ends of the end board are placed between the cleats of the side board. The end board is then straightened to close at the joint, and is securely held in this position by a lever hasp and pin.

An improved shelf support has been patented by Mr. Aaron Cole, of Filmore, Mo. The support consists of a base plate of any desired size and shape, on the upper surface of which there is a hollow upward extension provided in its interior with a screw threaded nut, with which a screw threaded shank engages that extends from the under surface of a plate, similar to the base plate. By this device shelves may be supported at any desired height.

An improved fire escape has been patented by Mr. Charles P. Wilson, of Summit Point, W. Va. A carriage that will hold one or more persons is provided with a rope and grappling hook. The hook is secured to any solid place in the room, and the opposite end of the rope is wound around a series of rollers journaled in the carriage near its bottom. These rollers are clamped by the weight of the person or persons in the carriage, and controlled so as to let them down slowly to the ground.

Mr. Orin Parker, of Washington, D. C., has patented an improved process for preserving meats, etc. The process consists in drying air by subjecting it to a freezing temperature, and then raising the temperature above the freezing point, and passing the cold air into the preserving room; the object in raising the temperature being to prevent the freezing of the articles to be preserved. Meat preserved in this way may be kept a considerable time after it is removed from the room.

Mr. William E. Marold, of Terre Haute, Ind., has patented a compound to prevent the hair of the head from falling out, and produce a new growth of hair in cases of baldness. The compound consists of decoction of hop roots, grapevine buds, and rosemary.

A necktie and collar fastener of novel construction has been patented by Messrs. Adolph Platky and Emanuel Finsterer, of New York city. The fastener is made with an ordinary button head provided with a flat shank having an eye at its outer end to receive an open spring link, the link being kept in place by notches formed in ends of the shank eye.

A device for removing the salt produced in vats by the evaporation of salt water has been patented by Mr. Henry N. Hewlett, of Oscoda, Mich. An upwardly inclined way having sides about the same height of the sides of the vat is applied to one of its ends, and the salt is removed from the bottom of the vat and carried up the inclined way by means of reciprocating scrapers made to operate forward and backward along the bottom of the vat.

A convenient and effective device for taking up the wear in thill couplings preventing rattling has been patented by Messrs. Charles N. Smith and Tim Murphy, of Danville, Ky. In the bottom of the thill coupling is placed a block, having a concave inner surface and a wedge shaped flange projecting upward at its rear side. Between this block and the thill iron is a rubber, and over the rubber a facing plate. A screw which passes through the bottom of the coupling forces up the wedge plate and tightens the coupling.

Mr. Samuel C. Kennedy, of Worthington, Ind., has patented a machine for sawing cord wood. In upright posts, secured to the top of a rectangular frame, are journaled horizontal shafts, the lower one carrying a large cog wheel and the upper a small cog wheel. To one end of the upper shaft is attached a balance wheel having a wrist pin to which is attached a pitman that carries the saw. Motion is imparted to the devices by a crank on the large cog wheel, and suitable devices are provided for holding the wood to be sawed.

Mr. William A. Reddick, of Niles, Mich., has patented improvements in the construction of table forks. The fork is formed of two pieces of wire, one longer than the other. The long piece is doubled upon itself, and the ends bent to form two tines, and the loop end is bent to form a handle. The short piece is straight, and placed between the tines of the long piece, and extends to the lower part of the handle. The pieces are then secured together by wires or ferrules, and tinned together, forming a cheap and durable fork.

A cake pan, composed of an expansible rim, having a catch of peculiar construction by which the ends of the ring are held together under pressure to form a close joint, and a bottom that is adapted to spring the rim open when the catch is released, so that the baked cake may be removed without handling the heated pan, has been patented by Mr. John R. Connor, of South Oil City, Pa.

Mr. Orin Parker, of Washington, D. C., has patented an improved method of making ice and cooling in general. In the bottom of the freezing room is a tank for catching the water to be frozen into ice, and supported above a floor in the top of the room is a series of shallow tanks placed one above the other, and containing salt water. Through these tanks pipes carrying compressed air and pipes carrying water pass, their lower ends extending into the freezing room. The expansion of the compressed air, as it passes into the room from the pipe, reduces the temperature of the room, and the water being thrown into the room in a spray freezes as it falls into the tank in the bottom of the room.

Mr. Edward P. Waters, of Roseville, Ill., has patented improvements in harness trees and pads, by which the skirts may be adjusted to any required length and firmly held. The harness tree is provided near its ends with pockets for receiving the ends of the skirts, and the skirts are held in their place in the pockets by the terrets, and by loops attached to the tree. The upper end of the skirt has holes through any of which the terrets may pass, lengthening or shortening the skirt as desired.

An ironing board that can be easily raised or lowered and locked in position has been patented by Mr. James T. King, of Fowler, Ind. The board is supported by two cross-pivoted pairs of legs, the upper ends of one pair being hinged to the underside of the board at one end, the upper end of the other pair of legs being hinged to a ratchet bar that slides longitudinally on the under side of the board between guide strips, and controls the height of the table by being moved out or in through the guide strip.

An improved compound for making brick, tile, etc., has been patented by Mr. Henry H. Hunt, of San Antonio, Tex. It consists in combining hydraulic cement with a soft stone known as "magnesian limestone," which has heretofore been considered a waste material. The stone is ground, and the materials thoroughly mixed dry, and then wet up and pressed in moulds, and after being dried for one day are soaked in water for two days, when they are ready for use.

Mr. Joshua E. Howard, of Grape Vine, Tex., has patented improvements in the ventilating attachment to hearths, patented by William S. Winfield, April 6, 1875. The improvement consists in extending the ventilating box downward sufficiently to project into the room below, and providing its front face with an air passage above the ash box, so that a current of air will always pass up from the room below that to which the ventilator is applied, and not be obstructed by the ash box.

A new fastening for a shoe lace has been patented by Messrs. Ewen C. C. Henderson, of Picton, and Thomas A. McDonald, of Durham, N. S. The invention relates to the class of shoes laced with a single lace. One of the flaps of the shoe above the holes or hooks for lacing, has three holes, arranged in a triangle, and through these holes the lace is passed in such a way that the end of the lace will be firmly held by a part of the lace on the outside of the flap.

Mr. John B. Gleason, of Dayton, O., has patented an improved car coupling, consisting of a hook-headed catch that is pivoted between the sides of the draw bar, and is concaved in its rear end, having rounded projections at the corners. Behind this hook is a sliding block, rounded to fit the concavity of the hook, and is held to it by a spring placed back of the block. In the center of the rounded end is a cavity into which one of the arms of the hook fits when the hook is open, to retain it open. The hook is opened and closed by levers secured to and operated from the sides of the car.

A new device for propelling vessels has been patented by Mr. August Bracht, of Baltimore, Md. The vessel is propelled by the action of currents of water or steam forced from a suitable reservoir in the vessel through pipes so constructed that where the currents of water or steam leave the pipes two currents are forced violently against each other, forming a broad flat jet by which the vessel is propelled.

Mr. George F. Hoeffer, of Chicago, Ill., has patented an improved coupling, consisting in a draw head, divided lengthwise by a vertical partition into two compartments, one of which contains a sliding plunger pressed out by a spring, and the other compartment has its outer side formed of a swinging latch wing having at its free end a slot into which a stud on the side of the opposite draw head passes when the cars are coupled. Levers connected with plungers draw them back for uncoupling.

A bearing for propeller shafts, that can be adjusted to take up wear without removing the propeller from the shaft, has been patented by Mr. George W. Zastrow, of Baltimore, Md. The bearing is constructed with a rectangular chamber, having its upper wall properly arched and lined, and a bearing block corresponding in shape to the chamber, and broader than the diameter of the propeller shaft, is inserted into the chamber and supported in contact with the shaft by means of a wedge plate, which is inserted under the block through an opening in the bearing. By inserting thicker wedge plates the wear of the bearing is taken up.

Mr. Charles T. Lanman, of Brookline, Mass., has patented improvements in metal planers for planing irregular forms. The tool holder and frame are connected by a screw to a rack bar that has at its lower end a small wheel that rolls over the pattern, and by suitable gear wheels the planing tool is caused to rise and fall automatically, to give the required shape.

A device for separating cockle from wheat has been patented by Mr. Abraham Life, of New Hampden, Va. A sieve, having spirally arranged ribs on its upper surface and two or more series of openings of just sufficient size to allow the cockle to pass through, has arranged over it a revolving brush for sweeping over the plate. The grain is fed down through an opening in the center of the brush, and as it is carried over the sieve, the brush holds the oblong kinds of wheat with their long diameters to the face of the sieve, and they pass over the openings, while the round cockle seeds drop through, the spiral ribs carrying the grain to the openings at the outer side of the sieve.

Mr. Frederic J. Gardner has patented improvements in sights for fire arms. The front sight is an opaque metal tube, arranged in longitudinal direction with the barrel of the rifle, having a transparent cross disk of glass, the disk having sight hole in its center. The glass does not obstruct any part of the target, and admits of the bull's eye being seen very distinctly through the hole. The rear sight has a transversely slotted body in which a cross slide having a sight hole moves for adjustment.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Iron can be rolled so thin that 10,000 sheets would only equal one inch in thickness, or about 80 sheets to make the thickness of one of Esterbrook's Bank Pens.

Wanted.—Superintendence of chemical works; 18 years' practical experience. Chemist, 38 Cottage Street, Bridgeport, Conn.

The premises formerly known as *U. S. Watch Factory and grounds* at *Marion*, Jersey City, will be sold at auction, Tuesday, Sept. 26, at 12 M., at Exchange Salesroom, 111 Broadway, New York, by A. J. Bleecker & Son. The building is iron, 3 and 4 stories; 80 x 250; with 3 story brick wing, 4 x 90. Suitable for light manufacturing purposes; 3 acres of ground, handsomely laid out. Map at auctioneers, 75 Nassau Street.

Baxter's Adjustable Wrenches fit peculiar corners where no other wrench will answer. Greene, Tweed & Co., New York.

Imperial Mange Cure. Best remedy ever prepared for mange on dogs or horses troubled with scratches. For sale at all gun and ammunition stores. Manufactured by H. Clay Glover, Toms River, N. J. Send for testimonials.

Electric Light and Electro-Plating Machines manufactured by Excelsior Electric Company, under the Improved System and New Patents of William Hochhausen. Mr. Hochhausen begs to inform his patrons and friends that he withdrew from the Arnoux & Hochhausen Elec. Co., January 1st, 1881, and has no further connection with that company. Wm. Hochhausen, Electrician for Excelsior Electric Co., 65 & 66 Duane St., N. Y.

See Bentel, Margedant & Co.'s adv., page 190.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Diamond Drills, J. Dickinson, 64 Nassau St., N. Y.

50,000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa.

Gould & Eberhardt's Machinists' Tools. See adv., p. 190.

Barrel, Key, Hogshead, Stave Mach'y. See adv. p. 188.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 188.

See New American File Co.'s Advertisement, p. 190.

Vertical Engines, varied capacity. See adv., p. 188.

Cutters for Teeth of Gear Wheels formed entirely by machinery. The Pratt & Whitney Co. Hartford, Conn.

Catechism of the Locomotive. 625 pages. 250 engravings. Most accurate, complete, and easily understood book on the Locomotive. Price $2.50. Send for catalogue of railroad books. The Railroad Gazette, 73 B'way, N.Y.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher, Schumm & Co., Philadelphia, Pa. Send for circular.

The Sweetland Chuck. See illus. adv., p. 190.

Empire Gum Core Packing, Soapstone Packing, and all kinds of Rubber Packing. Greene, Tweed & Co.

Steam Pumps. See adv. Smith, Valle & Co., p. 188.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co., 430 Washington Ave., Phil. Pa.

Knives for Woodworking Machinery, Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J.

Send stamp to Morse Yellow Dock Root Sirup Co., Providence, R. I., for descriptive circular and sets of elegant Advertising Cards.

Bostwick's Giant Riding Saw Machine, adv., page 173.

Draughtsman's Sensitive Paper. T. H. McCollin, Phila., Pa.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 172.

Woodwork'g Mach'y, Rollstone Mach. Co. Adv., p. 173.

Common Sense Dry Kiln. Adapted to drying of all material where kiln, etc., drying houses are used. See p. 174.

Cope & Maxwell M'f'g Co.'s Pump adv., page 157.

The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 157.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 157.

Red Jacket Adjustable Force Pump. See adv., p. 158.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 158.

4 to 40 H. P. Steam Engines. See adv. p. 94.

Drop Forgings. Billings & Spencer Co. See adv., p. 141.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 142.

Lightning Screw Plates, Labor-saving Tools. p. 126.

Engines, 10 to 50 horse power, complete, with governor, $150 to $350. Satisfaction guaranteed. Six hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinsville, N. Y.

Air Pumps for High Pressure, Hand, or Steam Power, at low prices. C. Beseler, 218 Center Street, New York.

Small articles in sheet or cast brass made on contract. Send models for estimates to H. C. Goodrich, 66 to 72 Ogden Place, Chicago, Ill.

Improved Skinner Portable Engines. Erie, Pa.

Combination Roll and Rubber Co., 68 Warren street, N. Y. Wringer Rolls and Moulded Goods Specialties.

Pure Water furnished Cities, Paper Mills, Laundries, Steam Boilers, etc., by the Multifold System of the Newark Filtering Co., 177 Commerce St., Newark, N. J.

"Abbé" Bolt Forging Machines and "Palmer" Power Hammers a specialty. Forsaith & Co., Manchester, N.H.

List 28, describing 3,600 new and second-hand Machines, now ready for distribution. Send stamp for same. S.C. Forsaith & Co., Manchester, N.H., and N.Y. city.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill.

First Class Engine Lathes, 20 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn.

Ice Making Machines and Machines for Cooling Breweries, etc. Pictet Artificial Ice Co. (Limited), 142 Greenwich Street. P. O. Box 3063, New York city.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your *free* book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers. (Forward above by postal or letter; mention this paper.)

Steel Stamps and Pattern Letters. The best made. J. F. W. Dorman, 21 German St., Baltimore. Catalogue free.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Presses & Dies (fruit cans) Ayar Mach. Wks., Salem, N.J.

NEW BOOKS AND PUBLICATIONS.

JOURNAL AND PROCEEDINGS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1881. Edited by A. Liversidge, Professor of Chemistry and Mineralogy, University of Sydney. Sydney: Thomas Richards, Government Printer.

This newly incorporated society (grown out of the Philosophical Society of Australasia) shows a commendable degree of vitality. Many of the papers would do credit to any scientific society. Among those of more than local interest presented last year are notes of a Journey on the Darling, by W. E. Abbott; Astronomy of the Australian Aborigines, by Rev. Peter MacPherson; New Double Stars and measures of some of those found by Sir John Herschel, by H. C. Russell, Government Astronomer, Sydney; and Census of the Genera of Plants hitherto known as Indigenous to Australia, by Baron Ferd. von Mueller.

THE FIRE PROTECTION OF MILLS. By C. J. H. Woodbury. New York: John Wiley & Sons.

A book well up to the times, embodying the results of the latest and best experience in the construction, furnishing, and management of textile mills with a view to diminishing the hazards of fire. There is need of similar works devoted to flouring and woodworking mills.

A TREATISE ON THE CONSTRUCTION AND USE OF UNIVERSAL MILLING MACHINES, as made by Brown & Sharpe Manufacturing Company. Providence, R. I.: Brown & Sharpe Manufacturing Company.

The scope of this work is sufficiently described on the title page. It is handsomely printed and bound.

THE INDUSTRIES OF NEW SOUTH WALES. By Charles Lyne. Sydney: Thomas Richards, Government Printer.

A readable survey of the industrial affairs of this enterprising colony by a capable observer who has gone carefully over the ground. As the information he presents has been subjected to local criticism, by being printed in letters to the Sydney *Morning Herald*, its general accuracy may in all probability be safely trusted. Its most promising industrial products appear to be wool, wine, gold, and tin.

MANUAL OF WOOD ENGRAVING FOR THE AMATEUR. By Arthur Hope. Chicago: The Colegrove Book Company.

The young people who want to try their hands at wood engraving next winter will find this a simple and practical guide to begin with.

MANUAL EDUCATION IN PUBLIC SCHOOLS. By L. H. Marvel. Boston: New England Publishing Company. 8vo, pp. 34. Plates.

A review of the manual instruction and training now given in some progressive schools, with reasons for extending such work. The subject will be more fully considered elsewhere.

COLLODIO-ETCHING. By Benjamin Hartley. New York: Industrial Publication Company.

A brief but sufficient guide to collodio-etching. The drawing is done with a needle upon a glass plate coated as for photographing and then printed like an ordinary photograph. It seems to be a cheap and simple method of duplicating sketches; and the author says that the drawing can be done rapidly out doors.

THE SCIENTIFIC EVIDENCES OF ORGANIC EVOLUTION. By George J. Romanes. London: Macmillan & Co

This latest volume of the Nature Series presents with great felicity an epitome of the broader arguments for the doctrine of organic evolution.

GRAHAM'S LITTLE TEACHER OF STANDARD PHONOGRAPHY.

Gives in a miniature volume Graham's Outline of Standard Phonography, standard phonographic reading and writing exercises, and correspondents' list of word signs and contractions. The book is neatly printed, and legible to such as have good eyes.

PROFESSIONAL PAPERS OF THE SIGNAL SERVICE. Prepared under the direction of General W. B. Hazen, Chief Signal Officer, Washington. Government Print.

These valuable contributions to astronomy and meteorology embraces: I. "Total Eclipse of the Sun, July, 1878," by Professor Cleveland Abbe; II. "Isothermal Lines of the United States, 1871-1880," by Lieut. A. W. Greeley, Acting Signal Officer; III. "Chronological List of Auroras, 1870 to 1880," by Lieut. Greeley; IV. (not received); V. "Information Relative to the Construction and Maintenance of Time Balls;" VI. "Reduction of Air Pressure to Sea Level at Elevated Stations West of the Mississippi River," by Henry A. Hazen.

GEOLOGICAL SURVEY OF NEW JERSEY. Annual Report of the State Geologist, for 1881, with Map. Trenton: John L. Murphy.

The larger portion of this year's volume is a discussion of the climate of the State by Professor J. C. Smock. An interesting chapter of the main report is devoted to a discussion of the encroachments of the sea upon the shore since the settlement of the country, and the evidence for and against a supposed slow but general lowering of the New Jersey coast within a century or so. The statistical chapter shows New Jersey to rank fourth in the list of iron-producing States. It leads all others in the manufacture of green glass.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

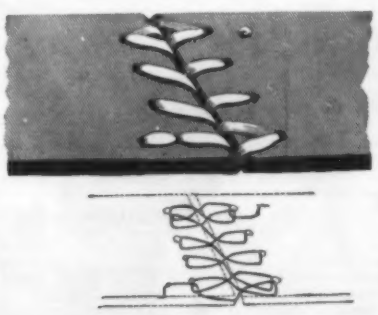
Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) R. F. asks: How many tons pressure is required to punch a one inch round hole through one inch wrought iron? A. It depends much upon the character of the iron and the construction of punch and die. The average is about 150,000 pounds.

(2) G. F. R. asks, 1st, whether tall chimneys sway while in the process of erection, or at any time? 2d. If not, why workmen have that idea? 3d. If they do sway, what is the explanation of it? A. They sway under the action of the wind.

(3) J. B. asks: 1. Is there any process other than by grinding or moulding by which a solid sphere of glass, from one-quarter to one-half inch in diameter, can be made? A. We know no process for making small spheres of glass, other than moulding or grinding. 2. What is the simplest and cheapest method of melting optical glass in small quantities? A. If you only wish to change the form or spread out glass that is already made, you may heat it on a plate or in any form made of clay, or clay spread upon an iron plate, so as to prevent the glass from sticking; and heating it in a muffle furnace, such as dentists and enamelers use. If you wish to make optical glass you will need the appliances of a glass house on a small scale; your pot will need be of the purest clay free from iron. The materials, pure white sand, or calcined and pulverized flints and oxide of lead or litharge, caustic soda and niter, are used in various proportions for making flint glass. The lead, soda, and niter are called the fluxes. The exact ingredients are kept a secret by glass makers, but the following proportions have been given as making a very fine glass: 120 parts fine clear sand, 40 parts purified pearl ash, 35 litharge, 13 niter, 1 part black oxide of manganese. 3. What "flux" is used for optical glass, and in what proportions? A. See answer above. 4. Is a sphere of glass a good and true magnifier? If so, what size is the best? A. A true sphere is a good magnifier, the smaller size having the greatest power.

(4) A. P. H. writes: I send you a sample of belt lacing which I am using in my factory. It is far superior to any other way of lacing. It runs smoother on small pulleys, as it bends to fit them. To lace it commence in middle or either side. If in middle divide



the string into equal lengths; if on edge, same as sketch, by fastening one end and running across and back. You will readily see its advantages. I suggest it, so others may be benefited. Do you think a dry pipe in a boiler is as good as a steam dome? A. No.

(5) R. N. writes: I am about to construct an electro-magnet, and would like to make the core one inch diameter; but do not know what length to make it, or the number or length of wire, or the number of Grove cells to use so as the magnet can support a weight of forty pounds. A. There is no particular rule for determining the length of the cores of an electro-magnet; but generally speaking a magnet intended for lifting great weight should have cores rather long in proportion to their diameter. For your purpose, say 10 diameters long. Wind these cores with 10 layers of No. 16 wire, and use two cells of Grove's battery.

(6) C. M. H. asks: Can you give me a cheap and effective method for purifying water that is impregnated with coal gas? The water is in a gas holder tank, very near my residence, and at times the odor from it is very disagreeable. A. Filtration through a bed of spongy iron ore, covered and underlaid with one of charcoal in fine fragments, will rid the water of this disagreeable contamination.

(7) E. L. D.—To polish wood in the lathe use alcoholic shellac varnish, 2 parts, and boiled linseed oil, 1 part. Shake well together before using. Apply a small quantity with a cloth, keeping up the friction until the polish is secured.

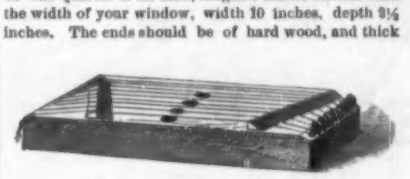
(8) W. H. F. asks how to prepare the gold saucers used by photographers. A. Grind gold leaf very fine on a marble or glass slab, using honey as a vehicle. When ground sufficiently fine, wash with water, allowing the gold powder to thoroughly subside at each washing. Finally mix the gold powder with a little gum water and apply to the saucers.

(9) J. S. V. asks: Is there any preparation that can be used that will harden immediately and be impervious to the weather for joining glass and iron together? A. See SUPPLEMENT, No. 158, "Receipts for Cements."

(10) E. L. S. asks: How can I purify the contents of a rain water cistern, holding twenty-five hundred gallons? Every now and then the water in it has a very unpleasant smell. A. This is probably caused by the decomposition of animal or vegetable matter accidentally fallen into the tank. This may be avoided by proper protection of its contents and remedied by filtering through charcoal in coarse powder.

(11) A. C. H asks: In what vessels besides glass can I produce hydrogen gas? A. Use a lead flask in which the edges are burnt together, or soldered with the joint out of contact with the materials.

(12) A. M. G. asks how to make an Æolian harp, as they are generally made. A. Æolian harps should be made to fit into a window so as to adjust the sash to cause a strong breeze across the strings of the instrument. Make the box of thin dry pine, the top piece or sounding board of extra clear stuff about three-sixteenths of an inch thick. Sides and bottom can be one-quarter of an inch, length 2 inches shorter than the width of your window, width 10 inches, depth 3½ inches. The ends should be of hard wood, and thick



enough at one end to hold the eyes or studs for fastening the wires or catgut strings. At the other end the wood should be thick enough to hold a set of violin keys, if you use catgut; or iron piano pins, if you use wire; which should be steel. Two bridges of hard wood glued diagonally across each end, for the strings to rest upon. If steel wire is used, a round wire should be inserted upon each bridge so that the sounding wires will not cut the wood. The rest you may gather from the sketch. The tuning should be harmonic, or say thirds, fifths and octaves. Make about four holes in sound board one inch diameter under the strings.

(13) M. A. writes: Can you inform me how peroxide of hydrogen may be made economically, and used to bleach feathers and not destroy them? A. Peroxide of hydrogen had better be bought from a druggist, but may be thus prepared: A sufficient quantity of peroxide of barium is placed in a suitable vessel and mixed with water. Sulphuric acid is then added until a piece of blue litmus paper dipped in the mixture just turns red; it is then filtered and used as directed in SUPPLEMENT, No. 339 or 349, under "Bleaching."

(14) W. T. R. asks: 1. What colors are used and how they are mixed to paint magic lantern slides? A. Aniline colors dissolved in alcohol are generally used. 2. What colors are used and how are they mixed to make opaque outlines? A. Any dense pigment mixed with drying oil or varnish will do. See SUPPLEMENT, No. 317.

(15) H. E. H. writes: I have a machine for extracting gold from sand, in which I use quicksilver. Having strained the quicksilver through a piece of bed ticking, I subject the amalgam, caught, to a bath of nitric acid, then to a little heat, and have to repeat it many times before I can bring the gold back to its natural color, and retain it in its grain form. If I use severe heat alone, it will melt it, and that is what I want to avoid. Can you suggest an easier method? A. It may be dissolved after most of the mercury has evaporated, in aqua regia, and separated as a fine purple powder by treating with a solution of sulphate of iron. Or it may be melted and granulated by pouring it into water.

(16) C. B. F. asks: What will loosen burnt core sand? I have boxes cast hollow, to hold oil, where the core is often burnt hard, making it impossible to move by the tumbler. A. Loosen the burnt sand with bent tools or files before putting in tumbler. Possibly you make your cores too hard. Put as little flour in the core sand as will make them stand handling. A few trials in this line will set you right. Pickling the castings with a sulphuric acid and water bath is much used where the cores cannot be touched with tools.

(17) M. H. says: Will you give a formula for preparing capro-ammonia. A. It is an ammoniacal solution of oxide of copper, prepared by adding aqua ammonia to a solution of sulphate of copper under the precipitate, which at first formic is redissolved.

[OFFICIAL.]

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August 29, 1882,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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Canned goods, Biggs, Clayton & Co 9,630
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Coffee, A. W. Frank 9,637
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Whisky, J. S. Finch & Co 9,631

English Patents Issued to Americans.

From August 15, 1882, to August 18, 1882, inclusive.

Axle, carriage, J. W. Varley, Englewood, N. J.
Balances, F. A. Roeder, Cincinnati, O.
Bleaching, process of, C. Toppan, Salem, Mass.
Book-holder, R. M. Lambie, New York city.
Boots and shoes, H. R. Adams, Boston, Mass.
Brewing, F. Gent, Columbus, Ind.
Butter, artificial, S. S. Cochran, Everett, Mass.
Car wheel, G. W. Mitimore, Chicago, Ill
Chairs, folding, F. G. Johnson *et al*., Brooklyn, N. Y.
Cigars and cigarettes, S. W. Wood, Cornwall, N. Y.
Dress shields, I. A. Canfield, Middletown, Conn.
Dyeing printed fabrics, C. Toppan, Salem, Mass.
Electricity, apparatus for supplying, T. A. Edison Menlo Park, N. J.
Electric lamp, C. E. Scribner *et al*., Chicago, Ill.
Hoisting apparatus, J. H. Lidgerwood, Morristown, N. J.
Leather, manufacture of, A. G. Fell, New York city.
Lubricating apparatus, T. Holland, Troy, N. Y.
Sash fastener, G. J. Dickson, Albany, N. Y.
Steam engine, P. Armington, Lawrence, Mass.
Telephone apparatus, C. E. Scribner *et al*., Chicago, Ill.
Tramway, rope, A. S. Hallidie, San Francisco, Cal.
Wheels, machine for cutting teeth of, C. E. Albro, Philadelphia, Pa.